United States Department of Agriculture

Final Environmental Impact Statement

for the Malheur, Umatilla, and Wallowa-Whitman National Forests Land Management Plans

Volume 3: Chapter 4, Glossary, and References

Forest Service Pacific Northwest Region 2018

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Chapter 4. Public, Governmental and Tribal Involvement; List of Preparers; and Distribution of the Environmental Impact Statement

The Forest Service facilitated broad public and intergovernmental participation in the plan revision process. Below is a summary of Forest Service efforts to consider the interests of the public, Tribes, States, counties, and Federal agencies.

Public Involvement

Public involvement is a critical element of the Forest Plan revision process. The interdisciplinary team provided a variety of opportunities for people to learn about the Forest Plans and participate in the planning process. The team provided informational products including factsheets, newsletters, open letters, presentation slides, and annotated maps. Information was shared electronically via the project website (fs.usda.gov/goto/BlueMountainsPlanRevision) and also through other modes of communication including email, hardcopy mail, news releases, news media interviews, public conference calls, webinars, and public meetings. Additionally, Forest Service officials held or attended public meetings in Oregon, Washington, and Idaho. During in-person meetings, staff provided verbal, visual, and written information about the Forest Plans. Live meetings and conference calls allowed participants to ask questions and hear answers in real time. Individuals and organizations sought further clarification via emails, letters, and phone calls. (Lists of individuals, organizations, officials, and others who contacted the Forest Service during the planning process are filed in the planning record.)

The planning interdisciplinary team and staff from the Blue Mountains national forests provided the following opportunities for public involvement:

1. Pre-scoping public meetings, workshops, and field trips
2. Scoping: notice of intent in the Federal Register, public meetings, and comment period
3. Draft Environmental Impact Statement alternative-development meetings
4. Publication of the Draft Environmental Impact Statement and subsequent public meetings during the formal comment period
5. Public “reengagement” meetings following the formal Draft Environmental Impact Statement comment period
6. Continuing communications through newsletters and conference calls
7. Publication of the Final Environmental Impact Statement and objection period

Prior to the formal scoping period, the planning interdisciplinary team and staff from the Blue Mountains national forests organized numerous public meetings, workshops, and field trips to gather input on the planning process. The planning team published its notice of intent to prepare a draft environmental impact statement in the Federal Register on March 29, 2010 (FR, Vol. 75, No. 59). The notice asked for written public comment on the proposal by May 25, 2010. During the scoping comment period, the planning team held additional public meetings in several locations in Oregon and Washington. In response, the Forest Service received 4,174 total responses to the request for comment, which included 110 unique comment letters and 4,025

organized form letters. The content analysis of the comments received is located in the planning record. Following the scoping period, the Forest Service held alternative-development meetings with a variety of organizations: advisory committees, collaborative groups, counties, industry representatives, and interest groups. Details are available in the planning record.

Table 418. Forest Service public meetings held before, during, and after the formal scoping period

Year	Type of Meeting	No. of Meetings	Locations
2004	Community Workshops (vision and desired conditions discussions)	20	La Grande, Enterprise, Baker City, Pendleton, Heppner, John Day, Burns, Portland, Oregon; Dayton and Pasco, Washington
2004	Co-convener Meetings*	5	La Grande and Baker City, Oregon
2005	Community Workshops (special designations, wild and scenic rivers, wilderness areas, and management areas discussion)	11	La Grande, Enterprise, Baker City, Pendleton, Heppner, John Day, Burns, Portland, and Milton-Freewater, Oregon; Dayton, and Pasco, Washington
2005	Field Trips	3	Malheur, Wallowa-Whitman, Umatilla National Forests
2005	Co-convener Meetings	6	La Grande and Baker City, Oregon
2006	Economic Workshops	2	La Grande and Baker City, Oregon
2006	Open Houses (to discuss strategies to achieve desired conditions)	7	La Grande, Enterprise, Pendleton, John Day, Burns, Sandy, Oregon and Dayton, Washington
2006	Co-convener Meetings	1	La Grande, Oregon
2008	Co-convener Meetings	2	La Grande, Oregon
2009	Co-convener Meetings	1	La Grande, Oregon
2010	Co-convener Meetings	2	La Grande, Oregon
2010	Public Meetings, Oregon	8	John Day, Burns, Pendleton, Heppner, Baker City, La Grande, Joseph, Portland
2010	Public Meetings, Washington	2	Dayton and Pasco
2011	Co-convener Meetings	3	La Grande, Oregon
2012	Co-convener Meetings	1	Baker City, Oregon
2013	Co-convener Meetings	1	Baker City, Oregon

* Co-convener meetings refers to meetings between the Blue Mountains forest plan revision team and representatives of the area counties, resource advisory committee members, Tribal representatives, and the State of Oregon.

2014 Public Meetings

In February 2014 the Forest Service published the Blue Mountains Proposed Revised Land Management Plan (Draft Forest Plan) and Draft Environmental Impact Statement. From March through June 2014, the three National Forests hosted 14 public meetings and a webinar to provide information about the documents, explain the formal public comment process, answer questions, and listen to public input. The notes taken at these meetings and the materials presented are available on the Blue Mountains Forest Plans website[1] and also filed in the planning record.

[1] https://www.fs.usda.gov/detail/wallowa-whitman/landmanagement/planning/?cid=stelprdb5247447

March 17, 2014: John Day Comment Session
March 18, 2014: Burns Comment Session
March 19, 2014: Long Creek Comment Session
March 20, 2014: Enterprise Comment Session
March 25, 2014: Baker City Comment Session
March 26, 2014: La Grande Comment Session
March 27, 2014: Halfway Comment Session
March 31, 2014: Portland Comment Session
April 1, 2014: Pendleton Comment Session
April 2, 2014: Heppner Comment Session
April 3, 2014: Dayton Comment Session
April 4, 2014: Kennewick Comment Session
April 9, 2014: Clarkston Comment Session
April 10, 2014: Ontario Comment Session
May 1, 2014: Unity Comment Session
June 25, 2014: Access and Wilderness Public Webinar

2015-2017 Public Involvement Efforts

Following the extended formal comment period in 2014, the interdisciplinary team and Blue Mountains national forests worked with communities and stakeholders to identify three topics for further discussion: pace and scale of restoration, access and wilderness, and livestock grazing. From June 2015 through February 2016, the Forest Service scheduled a series of public listening sessions, which were professionally facilitated to ensure that every participant had time to speak, listen to others, and propose solutions. Those meetings are listed below. The notes taken at these meetings are available on the project website at www.fs.usda.gov/goto/BlueMountainsPlanRevision and also filed in the planning record.

June 16, 2015: Access and Wilderness, Burns, OR
July 7, 2015: Access and Wilderness, John Day, OR
July 8, 2015: Access and Wilderness, Clarkston, WA
July 9, 2015: Access and Wilderness, Walla Walla, WA
July 13, 2015: Access and Wilderness, Enterprise, OR
July 14, 2015: Livestock Grazing, Burns, OR
July 15, 2015: Access and Wilderness, Richland, WA
July 16, 2015: Access and Wilderness, Ukiah, OR
July 21, 2015: Livestock Grazing, Enterprise, OR
July 22, 2015: Access and Wilderness, Pendleton, OR
July 23, 2015: Access and Wilderness, Heppner, OR
July 28, 2015: Pace and Scale of Restoration, Enterprise, OR
Nov. 2, 2015: Access and Wilderness, La Grande, OR
Nov. 4, 2015: Livestock Grazing, Heppner, OR
Nov. 9, 2015: Blue Mountains Forest Plans, Baker City, OR
Nov. 10, 2015: Technical Pack Goat Meeting, Pendleton, OR
Nov. 10, 2015: Livestock Grazing, Ukiah, OR
Nov. 12, 2015: Pace and Scale of Restoration, La Grande, OR
Nov. 12, 2015: Technical Forestry Meeting, La Grande, OR
Dec. 10, 2015: Pace and Scale of Restoration, Burns, OR
Dec. 11, 2015: Pace and Scale of Restoration, John Day, OR
Dec. 14, 2015: Livestock Grazing & Pace and Scale of Restoration, Clarkston, WA
Dec. 15, 2015: Livestock Grazing, North Powder, OR
Feb. 4, 2016: Nez Perce Tribe Town Hall Meeting, Lapwai, ID

The input shared during the public listening sessions listed above was helpful to the interdisciplinary team. The listening sessions brought additional context to the 2014 formal comments and enhanced the team's understanding of how different alternatives may affect diverse public interests. In response, during 2016 and 2017, the team developed two modified alternatives (E-Modified and E-Modified-Departure) and analyzed each in detail in the final environmental impact statement. The modifications in both alternatives respond to substantive public comments, listening session input, and revised recommendations by resource specialists. The team also continued with the analysis of other alternatives from the draft environmental impact statement.

During 2016 and 2017, the Forest Service consulted with Tribes and engaged with government entities at the Federal, State, and County levels. The table below summarizes meetings held in 2016 and 2017. Additional information is filed in the project record.

Table 419. Meetings held with Tribes, agencies and governments in 2016 and 2017

Entity	Number of Meetings
Cooperating Agency Counties	9
Other County Meetings	10
Confederated Tribes of the Umatilla Indian Reservation	10
Nez Perce Tribe	9
State of Oregon	4
State of Washington	4
NOAA National Marine Fisheries Service	24
U.S. Fish and Wildlife Service	24

Additionally, the interdisciplinary team continued to communicate with the public regarding the modified alternatives and the ongoing plan revision process through a variety of communication channels: newsletters, mail, email, website updates, and public conference calls. The newsletters, public conference call recordings, and other public information is available on the project website at www.fs.usda.gov/goto/BlueMountainsPlanRevision. Below is a list of newsletters issued and public conference calls held during 2016 and 2017.

Newsletters

- April 2016: Update on Forest Plans, including an open letter to the friends of the Blue Mountains
- June 2016: Update on Forest Plans, including information on Recommended Wilderness, Backcountry Areas, Wildlife Corridors & Designated Routes
- March 2017: Timber and Vegetation Management, New Team leader, and Sustainable Documents
- July 2017: Livestock Grazing and Grazing-land Vegetation
- Fall 2016: Update on Forest Plans, including topics related to our team leader transition, revised timeline, and our cooperation, coordination, and consultation with other agencies.

Public Conference Calls

- April 2016: Update on Forest Plans, including an open letter to the friends of the Blue Mountains
- July 2016: Update on Forest Plans, including information on Recommended Wilderness, Backcountry Areas, Wildlife Corridors & Designated Routes
- November 2016: Update on Forest Plans, including topics related to our team leader transition, revised timeline, and our cooperation, coordination, and consultation with other agencies.
- April 2017: Timber and Vegetation Management, New Team leader, and Sustainable Documents
- August 2017: Livestock Grazing and Grazing-land Vegetation

Involvement with Native American Tribes and Federal, State, and Local Agencies and Governments

The interdisciplinary team has worked with Tribes and government entities at the Federal, State, and County levels to inform the revised Forest Plans. This section describes efforts to engage with these different entities during the planning process.

Tribes

Federally recognized Tribes are sovereign nations with whom the United States has government-to-government relationships. Their long histories with these lands are well documented, and their knowledge and experience is helpful to Federal land managers. Therefore, the Forest Service seeks the advice and support of Tribal representatives. Through regular consultation, we exchange information and build mutual understanding that improves stewardship of the ecological and cultural resources that are significant to the Tribes.

The Forest Service's legal responsibilities to federally recognized Tribes are identified in treaties and clarified in statutes, executive orders, and case law. Tribal-U.S. treaties have legal authority under the U.S. Constitution, and the Forest Service has an obligation to uphold the rights recognized by those treaties. Tribal treaty rights often include fishing, hunting, gathering roots and berries, and pasturing horses and cattle. Executive Order 13175 on Consultation and Coordination with Indian Tribal Governments sets forth guidelines for all Federal agencies to (1) establish regular and meaningful consultation and collaboration with Tribal officials in the development of Federal policies that have Tribal implications, (2) strengthen the U.S. government-to-government relationships with Tribes, and (3) reduce the imposition of unfunded mandates on Tribes. Federal agencies are directed to consult with Tribes when engaging in policymaking or programs that may have implications on Tribal resources. In addition to Executive Order 13175, consultation obligations are included in a number of legal statutes, including the Federal Land Policy and Management Act and the National Historic Preservation Act. USDA Departmental Regulation 1350-002 on Tribal Consultation, Coordination, and Collaboration also provides direction.

In the Blue Mountains planning area, a significant portion of lands ceded by the Tribes in various treaties were designated as part of the National Forest System by the Organic Administration Act of June 4, 1897. Lands were ceded through the treaties of 1855 by the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation, the Nez Perce Tribe of Idaho, and the Confederated Tribes and Bands of the Yakama Indian Nation of the Yakama Reservation. The Klamath Tribes, via the Treaty with the Klamath Nation of 1870, ceded lands extending into the Malheur National Forest. These treaties are known for their specific language recognizing certain reserved rights of the Tribes in aboriginal use areas. Other federally recognized Tribes with interests in the management of the Blue Mountains national forests include the Burns Paiute Tribe, the Shoshone-Paiute Tribes of the Duck Valley Reservation, the Fort McDermitt Paiute and Shoshone Tribes, the Fort Bidwell Indian Community of Paiute Indians, and the Chief Joseph Band of the of the Nez Perce (now part of the Confederated Tribes of the Colville Reservation).

The following Tribes submitted formal comments in response to the February 2014 publication of the draft environmental impact statement and Draft Forest Plan:

- Confederated Tribes of the Umatilla Indian Reservation,
- Nez Perce Tribe of Idaho, and
- Shoshone-Bannock Tribes of the Fort Hall Indian Reservation.

The Forest Service has met its consultation requirements with qualified and interested Tribes at the government-to-government and staff-to-staff levels. (Details of Forest Service communications and meeting with the Tribes regarding this project are available in the planning record.) Tribal officials have been invited to participate in Forest Plan development since the beginning of the planning effort in 2003. As part of the planning process, forest supervisors, staff, and planning team members met with tribal staff, committees, and leadership, as well as tribal members who attended public meetings. The planning team carefully considered and addressed the formal comments submitted by the Tribes in response to the draft Environmental Impact Statement. Forest Service officials also continue to meet annually with tribal staff and officials to consult on national forest "programs of work," which have included the forest plan revision effort since 2004. Further, Forest Service officials reviewed relevant tribal planning and land-use policies, in accordance with 36 CFR 219.7(c) of the 1982 Planning Rule, and found no inconsistencies with the revised Forest Plans. Please see the table under "Government Planning and Land-Use Policies."

As a result of the efforts summarized above, this Environmental Impact Statement and the revised Forest Plans incorporate Tribal input. To ensure successful implementation, the planning team recommends that the national forests continue to work with the Tribes at the site-specific and project levels.

States

The planning area for the revised Forest Plans includes parts of Oregon and Washington State. State agencies with interests in the revised Forest Plans include, but are not limited to, the Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, Oregon Department of Forestry, and Washington Department of Natural Resources.

Forest supervisors and members of the planning team worked with State officials during the development of the revised Forest Plans. For example, the Forest Service met with State officials to discuss adjacent state and private lands in the planning area. (Meeting details are available in the project record.) These meetings and discussions strengthened management direction that will

help the national forests to be better neighbors in terms of providing wildlife habitat and also improving forest resiliency in the face of natural disturbances. The team also carefully considered the formal comments submitted by the States in response to the draft Environmental Impact Statement. Additionally, Forest Service officials reviewed relevant state planning and land-use policies, in accordance with 36 CFR 219.7(c) of the 1982 Planning Rule, and found no inconsistencies with the revised Forest Plans. Please see the table under "Government Planning and Land-Use Policies."

State input is incorporated in the Final Environmental Impact Statement and revised Forest Plans. The planning team recommends that the national forests continue to work with state agencies at the site-specific and project levels to ensure successful implementation.

Counties

The Forest Service began working with neighboring counties in 2003 on the plan revision process. The counties provided valuable early input in the development of the proposed action and public engagement process. The counties met frequently with the Forest Service during the pre-scoping, scoping, and alternative-development phases of the project, including public meetings in which county officials actively participated.

During the alternative-development phase, the counties signed memoranda of understanding conferring "cooperating agency" status in the plan revision process. In that capacity, the counties provided information and assisted with the development of alternatives (specifically Alternative D) for the 2014 draft Environmental Impact Statement. The following counties have current memoranda of understanding:

- Oregon counties – Grant, Harney, Morrow, Umatilla, Union, Wallowa, Wheeler
- Washington counties – Asotin, Columbia, Garfield, Walla Walla

Individual counties that submitted formal comment letters in response to the 2014 draft Environmental Impact Statement include: Baker, Columbia, Grant, Harney, Morrow, Umatilla, Union, Wallowa, and Wheeler. Additionally, the Eastern Oregon Counties Association, consisting of 11 county governments, submitted a consolidated formal comment letter in 2014. Comments addressed issues related to the pace and scale of restoration, timber volumes, access, grazing, the draft's social and economic analysis, wilderness, and a host of other comments on the preferred alternative. The Forest Service has addressed these comments in the response to concern statements.

Following the formal comment period in 2014 and associated public meetings, the Forest Service met with county officials to identify topics for further public discussion. During 2015 and 2016, the Forest Service scheduled a series of 24 public listening sessions that were hosted or attended by county officials. In response to public and county input, the planning team decided to analyze two modified alternatives in the environmental impact statement. To continue the cooperating agency process and exchange information regarding the modified alternatives, forest supervisors and the planning team continued to meet frequently with cooperating agency counties as a group during 2016 and 2017. During this period, forest supervisors and team members also met, upon request, with individual counties as well as county natural resource advisory committees. (Meeting details are available in the project record.)

As part of the planning process, Forest Service officials reviewed relevant county planning and land-use policies, in accordance with 36 CFR 219.7(c) of the 1982 Planning Rule. For a list of documents reviewed, please see the table under "Government Planning and Land-Use Policies"

below. The Forest Service found no inconsistencies between the revised Forest Plans and county documents – with the exception of the Baker County Natural Resources Plan. The results of this review can be found in the Government Planning and Land-Use Policies section.

As a result of these efforts, this Environmental Impact Statement and the revised Forest Plans incorporate county input. The planning team recommends that the national forests continue to work closely with neighboring counties to address site-specific and project-level interests.

Federal Agencies

A number of Federal agencies have interests within, or adjacent to, the Planning Area. These agencies include, but are not limited to, the U.S. Fish and Wildlife Service, National Marine Fisheries Service, Environmental Protection Agency, and Bureau of Land Management.

The planning team carefully considered and addressed the formal comments submitted by other Federal agencies in response to the draft Environmental Impact Statement. The Forest Service also worked with Federal officials during the development of the revised Forest Plans. For example, under the Endangered Species Act the Forest Service is required to engage in a formal consultation process with the U.S. Fish and Wildlife Service and National Marine Fisheries Service. Moreover, the Forest Service reviewed the relevant planning and land-use policies of other Federal agencies to ensure consistency and compliance in the revised Forest Plans. The national forests will continue to operate in accordance with existing federal law, regulation, and policy.

Consistency with Government Planning and Land-Use Policies

The Forest Service carefully considered the comments provided by other government entities. Additionally, as indicated in the sections above, the Forest Service reviewed the planning and land use policies of other government entities consistent with 36 CFR 219.7(c) of the 1982 Planning Rule:

> The responsible line officer shall review the planning and land use policies of other Federal agencies, State and local governments, and Indian tribes. The results of this review shall be displayed in the environmental impact statement for the plan (40 CFR 1502.16(c), 1506.2). The review shall include:
>
> 1. Consideration of the objectives of other Federal, State and local governments, and Indians tribes, as expressed in their plans and policies;
> 2. An assessment of the interrelated impacts of these plans and policies;
> 3. A determination of how each Forest Service plan should deal with the impacts identified; and
> 4. Where conflicts with Forest Service planning are identified, consideration of alternatives for their resolution.

The following section summarizes government planning and land use policies reviewed by the Forest Service. Additional documentation is available in the project record.

Washington State Dept. of Natural Resources (WDNR)

20-Year Forest Health Strategic Plan for Eastern Washington

Goals stated in the plan include: **1,** Conduct 1.25 million acres of scientifically sound, landscape-scale, cross-boundary management and restoration treatments in priority watersheds to increase

forest and watershed resilience by 2037. **2,** Reduce risk of uncharacteristic wildfire and other disturbances to help protect lives, communities, property, ecosystems, assets and working forests. **3,** Enhance economic development through implementation of forest restoration and management strategies that maintain and attract private sector investments and employment in rural communities. **4,** Plan and implement coordinated, landscape-scale forest restoration and management treatments in a manner that integrates landowner objectives and responsibilities. **5,** Develop and implement a forest health resilience monitoring program that establishes criteria, tools, and processes to monitor forest and watershed conditions, assess progress, and reassess strategies over time.

Washington State Dept. of Fish and Wildlife (WDFW)

Blue Mountains Wildlife Area Complex Management Plan

The Blue Mountains Wildlife Area Complex Management Plan includes the following goals and objectives: **1,** To have healthy and diverse fish and wildlife populations and habitats through protecting, restoring and enhancing fish and wildlife populations and their habitats. Through ensuring WDFW activities, programs, facilities and lands are consistent with local, state, and federal regulations that protect and recover fish, wildlife, and their habitats. Lastly, to minimize adverse interactions between humans and wildlife. **2,** To have sustainable fish and wildlife-related opportunities through providing sustainable fish and wildlife-related recreational and commercial opportunities compatible with maintaining healthy fish and wildlife populations and habitats, and through working with Tribal governments to ensure fish and wildlife management objectives are achieved. **3,** To have operational excellence and professional service through providing sound operational management of WDFW lands, facilities and access sites, and to reconnect with those interested in Washington's fish and wildlife.

Washington State Wildlife Action Plan

The Washington State Wildlife Action Plan will look to: **1,** Identify and safeguard wildlife and natural habitats important to many of our family traditions and for future generations. **2,** Conserve all wildlife and the habitats they live in, starting with the animals and places most in need of help. **3,** Assure that the natural habitats needed by wildlife are healthy enough to provide clean water and air for both wildlife and people.

Washington State Department of Recreation and Conservation

Recreation and Conservation Plan (2018-2022)

The conservation plan provides strategic direction to provide outdoor recreation and conservation for Washington State residents, and how to achieve conservation goals along with local, regional, state, and federal agencies, together with tribal governments, and private and non-profit partners. The conservation plan is delivered via the Washington State Recreation and Conservation Office website (https://www.rco.wa.gov/StateRecPlans/). The State Plan includes "Strategic Direction," a "Vision 2040" statement, and "Priorities and Recommendations" for the five priority areas that include: **Sustain Our Legacy**: Sustain and grow the legacy of parks, trails, and conservation lands. **Improve Equity**: Improve Equity of parks, trails, and conservation lands. **Get Youth Outside**: Meet the needs of youth. **Address Changing Demographics**: Plan for culturally relevant parks and trails to meet changing demographics. **Assert as a Vital Public Service**: Assert recreation and conservation as a vital public service.

A final section, Unifying Strategy, offers goals and recommendations based on research and findings presented within the 2018-2022 Recreation and Conservation Plan to address statewide priorities over the next five years.

In addition to these core topics, the State Plan includes individual, resource area specific plans that include: State Trails Plan, State Athletic Facilities Plan, Nonhighway and Off-road Vehicle Plan, Recreational Boating Plan, and a Recreation and Conservation Land Acquisition and Development Strategy. Each of the plans contain goal statements and provides recommendations that support achieving plan goals and that support regional planning and coordination.

Washington State Department of Historic Preservation

Washington State Historic Preservation Plan (2014-2019)

The 3-Part preservation plan provides an overview and planning process, the Washington State historic preservation plan, and a resource overview and historic preservation trends. Part 2, Washington State Historic Preservation Plan, provides three primary goals (outlined below), each with a subset of accompanying strategies and actions. The three primary goals are: **Goal 1**. Enhance communities by actively engaging historic preservation with other forces shaping our environment. **Goal 2**. Engage a broad spectrum of the public in preservation; Improve access to information. **Goal 3**. Strengthen policies and planning processes to enhance informed and cross-disciplinary decision-making for managing cultural and historic resources.

The preservation plan further identifies opportunities under Goal 3 to "establish policies and provide tools to improve protection of cultural and historic resources." Specifically, the preservation plan identifies the U.S. Forest Service in a supporting role to support these protection efforts through an increased understanding of Resource Advisory Committee (RAC) funding and its potential application to support survey and inventory work.

State of Oregon

Executive Order 13443: Facilitation of Hunting and Wildlife Conservation

The State encourages the Forest Service to address President Bush's Executive Order in the Revised Forest Plans when discussing forest management actions that may affect hunting and fishing opportunities on the Blue Mountains National Forests.

Department of Land Conservation and Development, Statewide Planning Goals

Statewide planning goals include: **1,** The Citizen Involvement goal encourages active citizen participation in all aspects of planning. **2,** The Land Use Planning goal will establish a land use planning process and policy framework as a basis for all decision and actions related to use of land and to assure an adequate factual base for such decisions and actions. **3,** The Forest Lands goal is to conserve forest lands by maintaining the forest land base and to protect the state's forest economy by making possible economically efficient forest practices that assure the continuous growing and harvesting of forest tree species as the leading use on forest land consistent with sound management of soil, air, water, and fish and wildlife resources and to provide for recreational opportunities and agriculture. **4,** The goal for Air, Water, and Land Resources Quality is to maintain and improve the quality of the air, water and land resources of the state. **5,** The Energy Conservation goal is to conserve energy.

Department of Forestry, Forestry Program for Oregon

The Forestry Program for Oregon includes the following goals: **Goal 1,** Promote a fair legal system, effective and adequately funded government, leading-edge research and education, and publicly supported environmental, economic, and social policies. **Goal 2,** Ensure that Oregon's forests make a significant contribution towards meeting the nation's wood product needs and provide diverse social and economic outputs and benefits valued by the public in a fair, balanced, and efficient manner. **Goal 3,** Protect and improve the productive capacity of Oregon's forests. **Goal 4,** Protect and improve the physical and biological quality of the soil and water resources of Oregon's forests. **Goal 5,** Conserve diverse native plant and animal populations and protect and improve their habitats in Oregon's forests. **Goal 6,** Protect and improve the health and resiliency of Oregon's dynamic forest ecosystems, watersheds, and airsheds. **Goal 7,** Improve carbon sequestration and storage and reduce carbon emissions in Oregon's forests and forest products.

Department of Forestry, Eastern Region Long-Range Forest Management Plan

The comprehensive plan includes the following goals and objectives: **1,** The management goal for air quality is to contribute to maintaining air quality that meets National Ambient Air Quality Standards and Prevention of Significant Deterioration Standards established by the Environmental Protection Agency under the federal Clean Air Act. **2,** The goals for fire management are to suppress wildfires and minimize the risk of their occurrence in the interest of conserving forest resources and protecting public safety, and to mitigate the effects of excluding natural fires from the forest ecosystem. **3,** The goal for forest health is to maintain or restore diverse, productive, resilient, and sustainable forest ecosystems. **4,** The overall management goal for timber is to maximize long-term revenues to the Common School fund and to produce income for counties, schools, and local taxing districts through a cost-effective, sustainable, and environmentally sound timber program.

Oregon Department of Fish and Wildlife (ODFW)

Oregon Conservation Strategy

The Oregon Conservation Strategy addresses many conservation issues including climate change, land use changes, invasive species, disruption of disturbance regimes, barriers to animal movement, water quality and quantity, and challenges and opportunities for private landowners to initiate conservation actions. These issues have many goals and objectives that relate to land and forest management, which include: **Climate Change –** use the best available science, technology, and management tools to determine the vulnerability of species and habitats to climate at a landscape scale. **Land Use Changes –** manage land use changes to conserve farm, forest, and range lands, open spaces, natural or scenic recreation areas, and fish and wildlife habitats. **Water Quality and Quantity –** Maintain or restore water quality in surface and groundwater to support a healthy ecosystem, support aquatic life, and provide fish and wildlife habitat.

Wildlife Species Management Plans

The State Supports and encourages the Forest Service to integrate ODFW wildlife species management plans in the revised Forest Plans. ODFW wildlife species management plans identify important ODFW wildlife management policies and strategies, and could be used by the Forest Service to guide management actions related to specific species, such as Rocky Mountain elk, mule deer, bighorn sheep, wild turkey, and other species.

Wildlife Area Management Plans

The goals set out in these plans include: protecting, enhancing and managing wetland habitats to benefit fish and wildlife species. To protect, enhance and manage upland habitats to benefit a wide variety of wildlife species, and to provide a variety of wildlife oriented recreational and educational opportunities to the public.

Department of Parks and Recreation

Oregon Statewide Outdoor Recreation Plan (SCORP)

The recreation plan identifies the U.S. Forest Service as one of several partners in recreation and natural resource program management and further acknowledges the "Forest Service is the largest single outdoor recreation provider in Oregon." Chapter Eight of the recreation plan outlines five statewide outdoor recreation issues and provides strategic actions needed to address each issue. The issues identified include: **Statewide Issue 1**: Provide adequate funds for routine and preventative maintenance and repair of facilities. **Statewide Issue 2**: Fund major rehabilitation of existing outdoor recreation facilities at the end of their useful life. **Statewide Issue 3**: Add more recreational trails and better trail connectivity between parks and communities. **Statewide Issue 4**: Recognize and strengthen park and recreation's role in increasing physical activity in Oregon's population. **Statewide Issue 5**: Recommend a standard set of sustainable park practices for outdoor recreation providers.

The Oregon recreation plan identifies challenges that confront public land managers, specifically the U.S. Forest Service, and notes a need for additional long distance trail opportunities, changing population demographics and the associated need for visitor services that respond to these changes, and sustainable planning and design for recreation facilities that provide quality recreation experiences. A comprehensive statewide recreation survey was conducted to inform Oregon's recreation plan and included workshop participation from multiple recreation providers including the U.S. Forest Service.

Historic Preservation Office (SHPO), Oregon Historic Preservation Plan 2018-2023

The preservation plan outlines two primary purposes: to guide internal SHPO activities including work plans and staffing; and to serve as the framework to coordinate statewide heritage preservation goals with individuals and organizations outside of the SHPO. The framework delivers Issue statements accompanied by Goal statements, and provides objectives for each individual issue. The ten Issue areas outlined in the Historic Preservation Plan are: **Issue 1:** Government Partnerships. **Issue 2:** Heritage Partner Networking and Advocacy. **Issue 3:** Public Outreach and Education. **Issue 4:** Professional Preservation Education. **Issue 5:** Digital Information Sharing and Accessibility. **Issue 6:** Identification and Designation of Cultural Resources. **Issue 7:** Preservation, Rehabilitation, and Protection of Cultural Resources. **Issue 8:** Grants and Funding. **Issue 9:** Economic Development. **Issue 10:** Statues, Ordinances, Codes, and Processes.

The historic preservation plan identifies the roles of the broader heritage community including federal and state agencies and acknowledges their roles to identify, evaluate, designate, and treat significant historic properties and archaeological sites. The preservation plan identifies a fifth component, "educate," that is important for connecting history to our everyday lives and for a maintaining public support.

Garfield County, Washington

Garfield County Comprehensive Plan

The Garfield County Comprehensive Plan includes the following goals: **1,** The natural resource industries goal is to maintain and enhance natural resource-based industries, including productive timber, agricultural, and fisheries industries. **2,** The open space and recreation goal is to encourage the retention of open space and development of recreational opportunities, conserve fish and wildlife habitat, increase access to natural resource lands and water, and develop parks. **3,** The environment goal is to protect the environment and enhance the state's high quality of life, including air and water quality, and the availability of water. **4,** The citizen participation and coordination goal aims to encourage the involvement of citizens in the planning process and ensure coordination between communities and jurisdictions to reconcile conflicts.

Malheur County, Oregon

Malheur County Comprehensive Plan

The Malheur County Comprehensive Plan includes the following goals: **1,** To develop a citizen involvement program that ensures the opportunity for citizens to be involved in all phases of the planning process. **2,** To establish a comprehensive planning process and policy framework as a basis for all decisions and actions related to land use and to assure an adequate factual base for those decisions and actions. **3,** To preserve and maintain forest lands for allowable agricultural and forest uses. **4,** To conserve open space and protect natural and scenic resources through cooperating with other public agencies that manage open land in Malheur County, as well as cooperating with agencies responsible for the management of designated natural and scenic areas and encouraging the expanded protection of these resources on publicly owned land.

Union County, Oregon

Land Use Plan, Union County, Oregon

The Land Use Plan of Union County, Oregon includes the following goals: **1,** That land and water resources be protected. **2,** That all lawful and authorized uses existing at the time of adoption of the Plan be allowed to continue, and expand according to Zoning Ordinance provisions. **3,** That existing uses be considered one of the primary considerations in establishing plan classification boundaries and that other physical, social, economic and legal factors also be taken into account. **4,** That any authorized use of land be encouraged to locate where it may have the opportunity to prosper without harm to its neighbors or to the economy of the County as a whole.

Asotin County, Washington

Asotin County Comprehensive Plan

The Asotin County Comprehensive Plan includes the following goals: **1, Agriculture -** to encourage the retention of the existing agricultural land base of Asotin County. Discourage conversion of the agricultural land base to other land uses and then only in accordance with the guidelines of the Comprehensive Plan. It shall be required of all levels of government and their agencies to consider the adverse impacts of their programs and projects on agriculture. **2, Energy Conservation** - Plan the use of land and encourage the use of urban design so as to minimize the demand for energy consumption and maximize the effectiveness of energy consumed. **3, Drainage, Flooding, and Stormwater Run-Off** - Actions regarding new proposed land uses should include provisions for the protection of the quality and quantity of ground water used for public water supplies. Actions regarding new proposed land uses should be reviewed for effects

on drainage, flooding, and storm-water run-off in the plan area and in the neighboring county area, including guidance for corrective actions of any discharges that pollute.

Columbia County, Washington

Columbia County Comprehensive Plan

The Columbia County Comprehensive Plan includes the following goals: **1, Natural Resource Industries -** Maintain and enhance natural resource-based industries, including productive timber, agricultural, and fisheries industries. **2, Open Space and Recreation -** Encourage the retention of open space and development of recreational opportunities, conserve fish and wildlife habitat, increase access to natural resource lands and water, and develop parks. **3, Environment -** Protect the environment and enhance the state's high quality of life, including air and water quality, and the availability of water. **4, Historic Preservation -** Identify and encourage the preservation of lands, sites, and structures that have historical or archaeological significance.

Morrow County, Oregon

Morrow County Comprehensive Plan

The Morrow County Comprehensive Plan includes the following goals: **1, Land Use Planning** - To establish an ongoing land use planning process and policy framework as the basis for all decisions and actions related to the use of land in the County and to assure an adequate factual base for such decisions and actions. **2, Forest Lands -** To conserve the forest land base in the County to provide for the continued availability of these lands for forest use. To encourage the application of management practices that maximize the continued productivity of timber lands, such as addressed by the Oregon Forest Practices Act. To encourage and support management practices which support existing use levels, particularly as related to the forest products industry, the dependent livestock sector, and the dispersed recreational user. **3, Air, Water, And Land Quality** - To maintain and improve the quality of the County's air, water and land resources.

Wheeler County, Oregon

Wheeler County Comprehensive Plan

The Wheeler County Comprehensive Plan includes the following goals: **1, Citizen Involvement –** To develop a citizen involvement program that insures the opportunity for citizens to be involved in all phases of the planning process. **2, Land Use Planning –** To establish a land use planning process and policy framework as a basis for all decisions and actions related to use of land and to assure an adequate factual base for such decisions and actions. It will do this through identifying lands suitable for farming, grazing and forest production. Open space is created by the accepted farming practices in the County. It will also look to determine the land requirements for projected economic development and population growth. **3, Forest lands –** To conserve forestlands for forest uses. **4, Air, Water, and Land Resources quality –** To maintain and improve the quality of air, water and land resources of Wheeler County.

Crook County, Oregon

Crook County Comprehensive Plan

The Crook County Comprehensive Plan includes the following goals: **1, Citizen Involvement**- To develop a citizen involvement program that ensures the opportunity for citizens to be involved in all phases of the planning process. **2, Land Use Planning** - To establish a comprehensive planning process and policy framework as a basis for all decisions and actions related to land use

and to assure an adequate factual base for those decisions and actions. **3, Agricultural Lands -** To preserve and maintain the agricultural land in the county for agricultural purposes. **4, Forest Lands -** To preserve and maintain forest lands for allowable agricultural and forest uses. **5, Open Space, Scenic and Historic Areas and Natural Resources -** To conserve open space and protect natural and scenic resources. **6, Air, Water, And Land Quality -** To maintain and improve the quality of Malheur County's air, water, and land resources. **7, Natural Disasters And Hazards -** To protect life and property from natural disasters and hazards.

Walla Walla County, Washington

Walla Walla County Comprehensive Plan

The Walla Walla County Comprehensive Plan includes the following goals: **1, Natural Resource Industries -** Maintain and enhance natural resource-based industries, including productive timber, agricultural, and fisheries industries. **2, Open Space And Recreation -** Encourage the retention of open space and development of recreational opportunities, conserve fish and wildlife habitat, increase access to natural resource lands and water, and develop parks. **3, Environment -** Protect the environment and enhance the state's high quality of life, including air and water quality, and the availability of water. **4, Citizen Participation And Coordination -** Encourage the involvement of citizens in the planning process and ensure coordination between communities and jurisdictions to reconcile conflicts. **5, Historic Preservation -** Identify and encourage the preservation of lands, sites, and structures that have historical or archaeological significance. **6, Critical Areas -** Recognize the importance of fish and wildlife habitat conservation areas while at the same time working towards a balance between preservation of those lands and the continuation of agriculture, forestry, mining and managed growth.

Grant County, Oregon

Grant County Comprehensive Plan

The Grant County Comprehensive Plan includes the following goals: **1, Forest Lands Element** - The Grant County Plan emphasizes the importance of wood products industry to the economy of the County. The Grant County Plan provides a list of 14 policies related to forest lands. In summary, these policies provide that forest resources should be considered when determining land use, that forest health and fire risk are important when residences are located near forested lands, and that wood products and agricultural needs are considered when making land use decisions on forest lands. **2, Natural Resources Element -** The Grant County Plan recognizes the importance of natural resources; including, land, vegetation, land quality, minerals, water, air, fish, and wildlife. It emphasizes the consideration of economic, energy, environmental, and social consequences when there are use conflicts. The Grant County Plan's overall land use policies are to: **a**, Support the County's economic base. **b,** Maximize preservation of agricultural and forest uses. **c,** Minimize use conflicts and allow for mining on agricultural and forest lands. **d,** Recognize current use patterns in development decisions. **e,** Encourage coordinated land management and conservation. **f,** Consider soil and use factors in proposals to alter current land uses. **g**, Seek a detailed County-wide soils analysis. **h**, Actively seek aid for stream bank improvement and erosion control. **i**, Promote County geology as a tourist-recreation base. **j,** Preserve the limited soil good for intense agricultural use. **k**, Prohibit conversion of land uses which decrease the economic base.

Umatilla County, Oregon

Umatilla County Comprehensive Plan

The Umatilla County Comprehensive Plan includes the following goals: **1, Citizen Involvement –** to develop a citizen involvement program that insures the opportunity for all citizens to be involved in all phases of the planning process. **2, Land Use Planning –** To establish a land use planning process and policy framework as a basis for all decisions and action related to use of land and to assure an adequate factual base for such decisions and actions. **3, Agricultural Lands –** To preserve and maintain agricultural lands through establishing four agricultural designations with several types of management regulations to protect and maintain the existing agricultural economy character of the county. **4, Forest Lands –** To conserve forest lands for forest users through encouraging a multiple use concept for grazing/forestland areas that will conserve forest uses, including agricultural activities (e.g. cultivation) found intermixed within forested lands through appropriate policies in the Comprehensive Plan and corresponding protection measures in the Development Ordinance.

Umatilla County, Oregon

Umatilla County Natural Hazard Mitigation Plan

The Umatilla County Natural Hazard Mitigation Plan includes the following goals: Protect life and property, public outreach, planned prevention, agency/citizen coordination, natural resource protection, and emergency service planning.

Baker County, Oregon

Baker County Natural Resources Plan

The purpose of the Baker County Natural Resources Plan is "…to set forth the policies of Baker County in regards to the use, and access to, natural resources located on public land." The Baker Plan also includes a list of "…principles to guide decision making governing natural resources within the County." These principles are: **1,** Expansion, revitalization and continuation of multiple uses on all public lands in Baker County. **2,** Multiple use shall be inclusive rather than exclusive, thereby avoiding pitting one use against the other. **3,** All plans shall mitigate based on multiple use rather than by a resource by resource issue. **4,** Maintain flexibility in all plans to allow for extraction of natural resources from public lands and to continue to use existing resources in accordance with all laws. **5,** Protect and preserve the following rights of all County's citizens, including: **a**, Private property interests, such as water and grazing rights and access to lands, which have ties to public lands. **b,** Traditional economic structures in the county that form the base for economic stability. **c,** Historic custom, culture and values of the local people, and **d,** Enjoyment of the natural resources of the County.

Wallowa County, Oregon

Wallowa County Natural Resource Plan

The Wallowa County Natural Resource Plan consists of the following documents: Wallowa County Hells Canyon National Rec. Area Comprehensive Mgmt. Plan (Alt. W), Wallowa County Community Wildfire Protection Plan, Upper Joseph Creek Watershed Assessment, Lower Joseph Creek Watershed Assessment and Rangeland Appendices, Wallowa County Board of Commissioners Travel Management Plan, Wallowa County - Nez Perce Tribe Salmon Habitat Recovery Plan, and Wallowa County Comprehensive Management Plan / Forest Plan. The latter

compiles direction from Wallowa County that is intended to apply to the Wallowa-Whitman National Forest. Key sections address Recreation, Ecological Condition, Forage Management, Forest Management, Heritage Resources and Traditional Uses, Riparian Management, and Wildlife Management. Each section includes management areas, standards, guidelines, and objectives.

Wallowa County, Oregon

Wallowa County Comprehensive Management Plan

The Wallowa County Comprehensive Management plan includes the following goals and objectives: **1, Recreation –** To manage outdoor recreation to ensure that recreational and ecological values and public enjoyment of the area are maintained and enhanced and compatible with the other uses of the forest. **2, Vegetation –** Sustainability of ecological functions and processes is deemed important to maintaining ecosystem health and shall be attained by promoting vegetation for seral stages (grassland vegetation) and structural stages (forested vegetation)**. 3, Forestland –** To Manage forested vegetation to maintain and/or enhance forested watershed conditions through following the watershed approaches in the Wallowa County/Nez Perce Tribe Salmon Habitat Recover Plan for forest management. To use precommercial thinning to improve the health and vigor of sapling-sized material and promote stand differentiation. **4, Riparian –** Maintain or enhance riparian conditions in Wallowa County through: a, improving riparian vegetation to increase streambank stability, water quality, dissipate energy during high flows and appropriately filter sediment/nutrients from runoff. b, improve vegetation to provide fish and wildlife habitat for a diversity of species.

Wallowa County, Oregon

Wallowa County Community Wildfire Plan

The Wallowa County Community Wildfire Plan includes the following goals: **1,** to promote wildfire awareness and target fire prevention and safety information across at-risk communities. **2,** to promote cooperative emergency fires response, identify available resources and needs, and review interagency communication and suppression strategies. **3,** to identify, assess, and reduce hazardous fuels, coordinate risk reduction strategies, and prioritize fuel reduction areas and projects. **4,** to complete annual monitoring and evaluation to assess progress and effectiveness and recommend changes as appropriate.

Wallowa County, Oregon

Wallowa County's Economic Base

The Wallowa County Economic Base is an economic profile that concentrates on natural resources. In describing the economic base, they focus on the basic industries or the basic component of each industry and determine what percentage of the local economy is dependent on that industry. They found that timber production and processing is responsible for 6 percent of jobs in Wallowa County, whereas government agency jobs account for 14 percent of the jobs in the county.

Wallowa County, Oregon

Custom and Culture of Wallowa County Oregon

The Custom and Culture document for Wallowa County focused on the "custom, culture, and community stability that have been, still is, and will be Wallowa County." With regards to natural

resources and land management, the document focuses on agriculture, outdoor recreation, grazing, and forestry.

Nez Perce Tribe, Idaho

Nez Perce Tribal Code

The Nez Perce Tribal Code includes provisions for Tribal Council and Government, Intergovernmental Rules and Regulations, Natural Resources and Environment, Water and Sewer Utility Authority, and Probate Ordinance. The Tribal Code includes sections related to natural resources management, such as Fish and Wildlife Provisions, and management of Salmon and Steelhead Guiding and Outfitting.

Nez Perce Tribe's Integrated Resource Management Planning documents (2017)

The Nez Perce Tribe's Integrated Resource Management Plan is intended to address the following questions and issues: **1, Economic development & returns:** To what extent should the Tribe's economic development efforts and economic revenue be maximized when impacts to its natural and cultural resources are anticipated? **2, Opportunities for resource restoration:** When and to what extent should the Tribe's lost or degraded natural and cultural resources be restored? **3, Opportunities for subsistence & traditional cultural practices:** When and to what extent should the Tribe manage its natural and cultural resources to support traditional cultural practices? **4, Resource impact assessments:** When and to what extent should the Tribe evaluate the impacts of its activities on its natural and cultural resources? **5, Resource protection:** When and to what extent should the Tribe's natural and cultural resources be administratively protected from harm? **6, Resource sustainability:** How sustainably does the Tribe wish to manage its natural and cultural resources? **7, Resource impact assessments:** When and to what extent should the Tribe evaluate the impacts of its activities on its natural and cultural resources? **8, Resource-based Tribal Employment:** How would the embrace of various resource management strategies impact Tribal employment? **9, Rural & wild land use:** How should the Tribe's rural and wild lands be used?

Nez Perce Tribe Department of Fisheries Resources Management Plan

The Nez Perce Tribe Department of Fisheries Resources Management Plan includes the following management goals: **1, Biological,** To achieve and maintain diverse and productive ecosystems with species composition and productivity consistent with historical conditions. To achieve and maintain fish abundance in tributary-specific areas at levels sufficient to support population persistence, harvest, and ecological processes. **2, Physical,** to achieve and maintain in-stream physical habitat structure and function to support populations self-sustained by natural reproduction and consistent with historic conditions. To ensure passage/access for all life stages of aquatic species in all streams and rivers. **3, Harvest,** to achieve harvest of 50% share of harvestable fish. Achieve tribal harvest in all population areas using traditional gear types and fishing methods and practices. Harvest opportunities currently available will be protected and enhanced. Mitigation goals must be met.

Wallowa County – Nez Perce Tribe Salmon Habitat Recovery Plan with Multi-Species Habitat Strategy

The Wallowa County – Nez Perce Tribe Salmon Habitat Recovery Plan sets forth a plan to restore and maintain habitat for chinook salmon (*Oncorhynchus tshawytscha*) and, potentially, other salmonid fish in Wallowa County, Oregon. The goals for salmon recovery are to provide spawning, rearing, and migration habitat within the County to assist in the recovery of Snake

River salmonids. These goals will be reached through looking at water quantity, water quality, fuel density, stream structure, and habitat requirements in riparian areas.

Nez Perce Precious Lands Draft Wildlife Area Management Plan

The goals of the Nez Perce Precious Lands Draft Wildlife Area Management Plan are to: **1,** Maintain or improve native plant communities and other desirable species to benefit fish and wildlife, and provide traditional gathering and cultural opportunities for tribal members. **2,** To maintain or enhance fish and wildlife populations. **3,** Provide public access for activities compatible with maintaining high quality wildlife populations and habitat. **4,** Foster productive, interactive relationships with neighboring landowners, including private individuals and state and federal agencies. **5,** Conduct Monitoring and Evaluation activities to ensure that management actions are providing the desired response and/or benefit.

Burns Paiute Tribe, Oregon

Burns Paiute Tribal Code

The purpose of the Burns Paiute Tribal Code is to provide a system of criminal justice, law enforcement, and resolution of civil matters for the people of the Reservation and members of the Burns Paiute Indian Tribe. The code covers a number of articles that relate to land and forest management including: Natural and Cultural Resources, and Rangeland Management.

Warm Springs Tribe, Oregon

Warm Springs Tribal Code

The Warm Springs Tribal Code includes provisions for Tribal Council and Government, Management, Tribal Courts, Public Safety and Justice, Physical Facilities and Natural Resources, Human Services, Enterprises, and Commercial Law. The Tribal Code includes sections related to natural resources management, such as Hunting and Trapping Protection and the Management of Archaeological, Historical, and Cultural Resources. The Warm Springs Wild and Scenic Rivers Act includes the following objectives: **Coordination with Federal and State River Planning Efforts** – effort will be made to coordinate tribal wild and scenic river plans with state and federal planning and management efforts. All efforts will be made to ensure that river plans are coordinated and consistent with each other. Plans will be adopted by Tribal Council resolution. **Range Management Within River Protection Areas** – Grazing of livestock within river protection areas must be done in a manner consistent with protection and enhancement of the natural values set forth in WSTC 401.100.

Warm Springs Tribe Comprehensive Plan

The Warm Springs Tribe Comprehensive Plan includes the following goals: **1,** to preserve, protect and enhance our cultural, environmental and natural resources. **2,** That they are a healthy, safe, productive and knowledgeable people. **3,** That their growing economy meets the income, employment and business needs of the community. **4,** That their homes and community are sources of pride and that they have various choices of where to live.

Confederated Tribes of the Umatilla Indian Reservation (CTUIR), Oregon

CTUIR Tribal Code

The Confederated Tribes of Umatilla Indian Reservation (CTUIR) Tribal Code includes codes related to Environmental Health and Safety, Fish and Wildlife, Historic Preservation, Land Development, Right to Work, and Tribal Employment Rights. The Tribal Code includes sections related to Natural Resources Management, such as Range, Agriculture and Forestry, Land Management, and Fisheries and Wildlife.

CTUIR Forest Management Plan

The Confederated Tribes of the Umatilla Indian Reservation Forest Management Plan includes the following goals and objectives: **Goal 1,** to provide sustainable and predictable outputs and services including, but not limited to, high quality water, fish and wildlife habitat, native plant communities, and timber. **Goal 2,** to sustain traditional, subsistence, and other cultural needs of the Confederated Tribes. **Goal 3,** to provide consistent direction for management of forest resources. **Objective 1,** to identify desired conditions of vegetation structure, composition, and distribution; hydrologic process and functions; and aquatic habitat structure and diversity. **Objective 2,** to provide for the uses and values of the Confederated Tribes regarding natural resources consistent with maintaining healthy, diverse ecosystems. **Objective 3,** to emphasize adaptive management.

CTUIR Comprehensive Management Plan

The Confederated Tribes of the Umatilla Indian Reservation Comprehensive Management Plan includes the following goals and objectives: **1, Land Base Restoration –** Restore Umatilla Indian Reservation Lands to the extent feasible to pre-treaty conditions to optimize current and traditional tribal land use values and ownership. **2, Natural Resources –** to protect, restore, and enhance the first foods – water, salmon, deer, cous, and huckleberry – for the perpetual cultural, economic, and sovereign benefit of the CTUIR. They will accomplish this by utilizing traditional ecological and cultural knowledge and science to inform: **a,** population and habitat management goals and actions; and **b,** natural resource policies and regulatory mechanisms. **3, Cultural Heritage –** to protect, restore, interpret and foster the CTUIR's cultural and historical knowledge, objects, information, places and resources for the benefit of current and future generations. **4, Treaty Rights Protection –** to provide first foods resources and the ecological conditions necessary for the long term, and sustained exercise of rights reserved in the treaty of 1855 for fishing, hunting, gathering and livestock pasturing and associated water rights for instream flow and consumptive use, and to protect and defend these treaty-reserved rights.

Consistency Conclusion

Given the programmatic nature of the revised Forest Plans, the Forest Service found no inconsistencies, interrelated impacts, or conflicts with these other government documents – with the exception of the *Baker County Natural Resources Plan*,[2] as adopted in July 2016. The Baker County Natural Resources Plan (hereafter referred to as the "Baker Plan") articulates principles and policies for public lands within Baker County, including national forest lands. Although the revised Forest Plans share many common principles with the Baker County plan, the Forest

[2] http://www.bakercounty.org/commissioners/pdfs/Adopted_Natural_Resource_Plan_20160620C.pdf

Service review also identified several potential interrelated impacts. The paragraphs below provide a detailed review of the Baker Plan with respect to the revised Forest Plans.

The Forest Service acknowledges that some interrelated impacts may occur across national forest boundaries regardless of the revised Forest Plans. Some of these potential impacts may occur naturally, such as those due to wildfires, insects, diseases, and wildlife. Many cross-boundary impacts, although addressed by the revised Forest Plans, cannot be resolved by the revised Forest Plans alone. For example, although the revised Forest Plans analyze an increase in forest thinning to reduce the risks of uncharacteristic wildfires (that is, to reduce wildfire size and severity) it is widely understood that wildfires are a natural part of the landscape and will cross jurisdictional boundaries in the future. Even so, the Forest Service will continue to work with its neighbors to reduce cross-boundary impacts.

The revised Forest Plans provide a programmatic framework for the management of the Malheur, Umatilla, and Wallowa-Whitman National Forests. By itself, this programmatic framework will not directly impact current national forest uses or conditions without additional project-level analysis, decisionmaking, and/or implementation. By design, the revised Forest Plans do not directly impact Baker County's ability to pursue its plans and policies in areas under County jurisdiction. To confirm this, the Forest Service reviewed the Baker County Comprehensive Plan and found no interrelated impacts or conflicts. As stated in the Baker County Comprehensive Plan (p. 34, Goal II, Part H, Other Lands), "Lands managed by the United States Forest Service and the Bureau of Land Management are beyond the scope of the County's planning jurisdiction." In contrast with the Baker County Comprehensive Plan, its Natural Resources Plan contains a number of policies that are intended to apply to public lands that are beyond the scope of the County's self-defined planning jurisdiction.

Consideration of the Baker County Natural Resources Plan Objectives (Baker Plan):

1. Expansion, revitalization and continuation of multiple uses on all public lands in Baker County.
2. Multiple use shall be inclusive rather than exclusive, thereby avoiding pitting one use against the other.
3. All plans shall mitigate based on multiple use rather than by a resource by resource issue.
4. Maintain flexibility in all plans to allow for extraction of natural resources from public lands and to continue to use existing resources in accordance with all laws.
5. Protect and preserve the following rights of all County citizens, including:
    a. Private property interests, such as water and grazing rights and access to lands, which have ties to public lands;
    b. Traditional economic structures in the county that form the base for economic stability;
    c. Historic custom, culture and values of the local people; and
    d. Enjoyment of the natural resources of the County.

Many of the principles and policies of the Baker Plan are consistent with the social, economic, and ecological goals and plan components of the revised Forest Plans. However, there are also important differences. Below is a summary of Baker Plan policy statements related to the revised

Forest Plans. After each policy statement is a Forest Service response, including an assessment of interrelated impacts, a determination of how the revised Forest Plans should deal with the impacts identified, and, where conflicts with Forest Service planning are identified, consideration of alternatives for their resolution.

Economy: The Baker Plan economic policy is to ensure that economic considerations are taken into account when making land management decisions and to minimize any adverse economic impacts.

Forest Service response:

- *Assessment of interrelated impacts:* There are no interrelated impacts at the level of the revised Forest Plans. The revised Forest Plans consider economic values and seeks to balance them with social and environmental values.
- *Determination of how the revised Forest Plans should deal with the impacts identified:* Not applicable
- *Where conflicts with Forest Service planning are identified, consideration of alternatives for their resolution:* Not applicable

Access: The Baker Plan's policy on access is to "…provide access for multiple land uses while respecting private property rights as well as utilizing the resources on public lands." The Baker Plan also includes a policy that there will be "no net loss to access" and "no net loss of our open roads system."

Forest Service response:

- *Assessment of interrelated impacts*: The revised Forest Plans support access for multiple uses. However, a requirement of "no net loss" of open roads is not included in the revised Forest Plans. Such a commitment would not be possible at the programmatic level of the revised Forest Plans, given the variety of site-specific resource issues (e.g., water quality, fish habitat, wildlife habitat) that need to be evaluated before making a site-specific decision.
- *Determination of how the revised Forest Plans should deal with the impacts identified:* The revised Forest Plans, by themselves, will not change the national forest transportation system without further analysis, decision-making, and implementation at the project level. The Forest Service will provide additional opportunities for County input at the project level.
- *Where conflicts with Forest Service planning are identified, consideration of alternatives for their resolution:* Not applicable

Agriculture: The Baker Plan includes a policy to maintain historic stocking rates for federal grazing permits. It also includes a policy that historical stocking rates should only be reduced under certain conditions: (a) failure to meet range health standards is established on the basis of current, on-the-ground monitoring data; (b) failure to meet range health standards is shown to be caused by current, as opposed to historic, livestock management practices; and (c) all adaptive management approaches have been exhausted.

Forest Service response:

- *Assessment of interrelated impacts:* The revised Forest Plans support continued livestock grazing. In general, the Forest Service agrees with the County regarding the value of current, on-the-ground monitoring data, and the Forest Service considers the

contributions of current livestock management practices and the mitigating effects of adaptive management approaches. However, the revised Forest Plans do not include a requirement to maintain historic stocking levels for federal grazing permits subject to the County's three conditions. The revised Forest Plans do not determine stocking levels; this is a site-specific consideration that would not be appropriate at the level of the revised Forest Plans. The revised Forest Plans determine areas suitable for livestock grazing, and the revised Forest Plans address a variety of resource concerns related to grazing. For example, a guideline to address the relationship between riparian vegetation condition and grazing in riparian areas identifies annual use indicators and values, such as stubble height and woody browse utilization.

- *Determination of how the revised Forest Plans should deal with the impacts identified:* Suitability determinations, standards, guidelines, etc. in the revised Forest Plans will influence future, site-specific decisions regarding grazing. To address potential impacts, the Forest Service considered the input of permittees, counties, and regulatory agencies during the planning process.
- *Where conflicts with Forest Service planning are identified, consideration of alternatives for their resolution:* The Forest Service developed and analyzed a range of alternatives for livestock grazing, and Baker County provided input regarding these alternatives. Further discussion and clarification at the site-specific level is recommended to resolve potential conflicts between plans and policies.

Energy: The Baker Plan's energy policy is that there will be no new development of energy resources unless they directly benefit residents of the County. In addition, there will be no development of alternative energy on forested lands.

Forest Service response:

- *Assessment of interrelated impacts:* The revised Forest Plans make general suitability determinations for energy development but does not restrict the new development of energy resources to projects that directly benefit residents of the County.
- *Determination of how the revised Forest Plans should deal with the impacts identified:* There are differences between the Baker Plan policy and federal policy regarding energy development on national forests. For example, the Energy Policy Act of 2005 encourages energy development in suitable areas and, accordingly, the revised Forest Plans analyze wind energy potential across the landscape and determines areas that are *generally* suitable for wind energy development. In the future, a proposed wind energy project would need to be further analyzed at the site-specific level and follow Forest Service procedures for a Special Use permit. To offer another example, new power lines on the national forests would also require site-specific analysis and Special Use permits.
- *Where conflicts with Forest Service planning are identified, consideration of alternatives for their resolution:* Future energy development proposals on the national forests will require additional site-specific analysis and decision-making, and the County will have opportunities to comment.

Forest Resources: The Baker Plan's policy directs that timber harvest should be used to promote forest health, prevent timber waste, bolster the economy, and foster a permanent road system. It is the County's policy that "all tree mortality caused by forest fire and pests shall be harvested before additional loss of economic value occurs."

Forest Service response:

- *Assessment of interrelated impacts:* The revised Forest Plans are intended to support forest health and provide economic benefits. To that end, the revised Forest Plans' proposed Timber Sale Program Quantities would more than double current levels of timber harvest. However, fostering a permanent road system is not a desired condition for timber harvest in the revised Forest Plans. Further, the revised Forest Plans cannot commit that "all tree mortality caused by forest fire and pests shall be harvested before additional loss of economic value occurs." In contrast, the revised Forest Plans include desired conditions for snags and post-fire habitat that are based on the natural range of variation. Future salvage logging decisions will require site-specific analysis.
- *Determination of how the revised Forest Plans should deal with the impacts identified:* During the planning process, the Forest Service developed and analyzed a range of alternatives for timber harvest, including suitable acres and outputs. Baker County provided input regarding these alternatives.
- *Where conflicts with Forest Service planning are identified, consideration of alternatives for their resolution:* Further discussion and clarification will be needed to minimize potential conflicts between plans and policies. Future timber harvest and salvage logging projects on the national forests will require additional site-specific analysis and decision-making, and the County will have opportunities to provide input.

Invasive Species: The Baker Plan's policy is to reduce and treat the spread of invasive plant and animal species.

Forest Service response:

- *Assessment of interrelated impacts:* There are no interrelated impacts at the level of the revised Forest Plans. The Forest Service also works to reduce and treat the spread of invasive plant and animal species, and the revised Forest Plans support this continued effort.
- *Determination of how the revised Forest Plans should deal with the impacts identified:* Not applicable
- *Where conflicts with Forest Service planning are identified, consideration of alternatives for their resolution:* Not applicable

Mining: The Baker Plan's policy is to foster and encourage mineral development within the county.

Forest Service response:

- *Assessment of interrelated impacts:* There are no interrelated impacts at the level of the revised Forest Plans. However, there are broader differences between County policy and existing federal policy regarding mineral administration, including the schedule for approving mining Plans of Operation, Best Management Practices, mitigation measures, and reclamation bonds. The Forest Service manages mining and minerals consistent with the General Mining Act of 1872 and associated regulations (e.g., 36 CFR 228).
- *Determination of how the revised Forest Plans should deal with the impacts identified:* The revised Forest Plans cannot address the potential impacts.

- *Where conflicts with Forest Service planning are identified, consideration of alternatives for their resolution:* Further discussion and clarification will be needed to minimize potential impacts and conflicts between our plans and policies.

Recreation and Tourism: The Baker Plan supports maintaining or increasing recreational opportunities and opposes land use fees or increasing land use fees to participate in recreation within the county.

Forest Service response:

- *Assessment of interrelated impacts:* There are no interrelated impacts at the level of the revised Forest Plans. The revised Forest Plans support recreation and tourism, and the Forest Service will continue to work with the County to enhance sustainable recreation and tourism opportunities. Fees are not a Forest Plan decision.
- *Determination of how the revised Forest Plans should deal with the impacts identified:* Not applicable
- *Where conflicts with Forest Service planning are identified, consideration of alternatives for their resolution:* Not applicable

Special Designations: The Baker Plan includes a policy that no special designations should be made within the county unless the county supports the designation (e.g. Recommended Wilderness, Wild and Scenic Rivers).

Forest Service response:

- *Assessment of interrelated impacts:* Baker County has indicated that it does not support special designations in the revised Forest Plans. However, the revised Forest Plans still include alternatives with proposed new Recommended Wilderness and Wild and Scenic River designations on national forest lands within Baker County. These areas were analyzed in accordance with the Wilderness Act, Wild and Scenic Rivers Act, and associated federal regulations.
- *Determination of how the revised Forest Plans should deal with the impacts identified:* During the planning process, the Forest Service developed and analyzed a range of alternatives for Recommended Wilderness and other special designations. Baker County and many others provided input on these alternatives, and the Forest Service made adjustments to the revised Forest Plans. For example, the Recommended Wilderness areas in the revised Forest Plans have been allocated predominantly within pre-existing inventoried roadless areas, and boundaries have been drawn to minimize impacts on current uses.
- *Where conflicts with Forest Service planning are identified, consideration of alternatives for their resolution:* The revised Forest Plans include a range of alternatives for special area designations that will be considered in the final decision.

Threatened or Endangered Species: The Baker Plan's policy is that threatened or endangered species should be managed in strict accordance with the provisions of the Endangered Species Act.

Forest Service response:

- *Assessment of interrelated impacts:* There are no interrelated impacts at the level of the revised Forest Plans. The revised Forest Plans must comply with the Endangered Species

Act. Additionally, the law requires a special review, called "formal consultation," by the U.S. Fish and Wildlife Service and National Marine Fisheries Service to ensure compliance with the Act.

- *Determination of how the revised Forest Plans should deal with the impacts identified:* Not applicable
- *Where conflicts with Forest Service planning are identified, consideration of alternatives for their resolution:* Not applicable

Water and Water Rights: The Baker Plan's policy is that any federal decision affecting water or water rights is coordinated with Baker County.

Forest Service response:

- *Assessment of interrelated impacts:* There are no interrelated impacts at the level of the revised Forest Plans. The Forest Service must comply with State law on water rights.
- *Determination of how the revised Forest Plans should deal with the impacts identified:* Not applicable
- *Where conflicts with Forest Service planning are identified, consideration of alternatives for their resolution:* Not applicable

Watersheds: The Baker Plan's policy is to sustain economic development and to maintain and improve stream, floodplain, wetland, and groundwater functions.

Forest Service response:

- *Assessment of interrelated impacts:* There are no interrelated impacts at the level of the revised Forest Plans.
- *Determination of how the revised Forest Plans should deal with the impacts identified:* Not applicable
- *Where conflicts with Forest Service planning are identified, consideration of alternatives for their resolution:* Not applicable

Wildfire: The Baker Plan's policy is to promptly and effectively respond to wildfires and ensure coordination with Baker County on wildfire response.

Forest Service response:

- *Assessment of interrelated impacts:* There are no interrelated impacts at the level of the revised Forest Plans.
- *Determination of how the revised Forest Plans should deal with the impacts identified:* Not applicable
- *Where conflicts with Forest Service planning are identified, consideration of alternatives for their resolution:* Not applicable

Wildlife: The Baker Plan's policy is to mitigate damage caused by wildlife to private land and to prohibit establishing wildlife corridors.

Forest Service response:

- *Assessment of interrelated impacts:* Various Forest Plan components work together to encourage wildlife (e.g., elk) to use the national forests and reduce wildlife damage to private lands. (Please note: The Forest Service is responsible for providing quality habitat for wildlife on national forests, whereas the State Departments of Fish and Wildlife are responsible for wildlife populations.) Most Forest Plan alternatives do not include wildlife corridors, but Alternatives C and E do include wildlife corridors.
- *Determination of how the revised Forest Plans should deal with the impacts identified:* Baker County asked for no wildlife corridors, while other commenters asked for wildlife corridors. In response, the revised Forest Plans include alternatives with and without wildlife corridors.
- *Where conflicts with Forest Service planning are identified, consideration of alternatives for their resolution:* Wildlife corridors will be considered in the final decision. If they are ultimately included in the final revised Forest Plans, further discussion will be needed to minimize potential impacts or conflicts between plans and policies.

Data Quality: The Baker Plan section on Data Quality requires that "*all data—environmental, economic, and social—used to develop federal land and natural resource use decisions be impartial, collected using tested and peer reviewed methods, and current*." The county opposes using "*computer modeling and other remotely-collected data*," although the county allows for these data to supplement monitoring or other on-the-ground data, with the caveat that we state the methods, estimate mapping error, and apply methods at the appropriate scale.

Forest Service response:

- *Assessment of interrelated impacts:* The Forest Service agrees with the County on the principal of data quality and the importance of stating methods, estimating mapping error, and applying methods at the appropriate scale. The revised Forest Plans use a variety of information sources, including field-collected monitoring and trend data, remotely collected data, as well as information derived from computer modeling programs that use both remotely and field-collected data.
- *Determination of how the revised Forest Plans should deal with the impacts identified:* The Forest Service acknowledges the County's opposition to "computer modeling and other remotely-collected data." However, using only on-the-ground data would not be practical at the level of the revised Forest Plans. Given the need to aggregate information across an approximately five million acre planning area, computer modeling and remotely collected data are appropriate.
- *Where conflicts with Forest Service planning are identified, consideration of alternatives for their resolution:* Further discussion may be needed to minimize potential impacts or conflicts between plans and policies.

Comment Letters from Native American Tribes and Federal, State, and Local Agencies and Governments

The following letters were received during the comment period on the draft environmental impact statement from Native American Tribes and Federal, State, and local agencies and governments. They are reproduced here in their entirety as required by Forest Service Handbook 1909.15.

Confederated Tribes *of the* **Umatilla Indian Reservation**
Department of Natural Resources
Administration

46411 Timíne Way
Pendleton, OR 97801

www.ctuir.org ericquaempts@ctuir.org
Phone 541-276-3165 Fax: 541-276-3095

August 29, 2014

Kevin Martin, Forest Supervisor Umatilla National Forest
72510 Coyote Rd.
Pendleton, OR 97801 Dear Kevin:

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) Department of Natural Resources (DNR) appreciates the opportunity to comment on the Draft Environmental Impact Statement for the Proposed Revised Land Management Plans for the Malheur, Umatilla, and Wallowa Whitman National Forests (DEIS). The DNR appreciates how much the plan has improved over the years, however the delays and staff turn-over at the Forest Service has led to some staff fatigue of reviewing this plan. Based on the DEIS, the CTUIR DNR believes that Alternative C is the appropriate alternative to address treaty reserved rights and resources. DNR is concerned that work on cultural resources among the forests remains inconsistent.

General Comments:

Language in the DEIS regarding our comments on Treaty rights was improved and the CTUIR appreciates the changes:

> The Forest Service has the requirement to manage lands with full consideration of the Federal trust responsibilities to tribal rights and to the interests and treaty reserved rights and resources of federally recognized American Indian tribes.

However, the language was moved from Chapter 1, page 11 in the May 2012 draft to Volume 3, Chapter 4, Page 2, over 700 pages into the document. DNR believes that the document should mention Treaty rights in Volume 1, Chapter 1, Page 16-17, in the Legal and Regulatory Framework section. This section mentions “American Indian reserved rights” but does not specifically mention the Treaties that reserve those rights. This might seem trivial to an uninformed observer, but under the Constitution of the United States, the Treaty of 1855, 12 Stat. 945, has the same standing as the Clean Water Act, the Endangered Species Act and the National Environmental Policy Act. Article VI of the US Constitution states:

> This Constitution, and the laws of the United States which shall be made in pursuance thereof; and all treaties made, or which shall be made, under the authority of the United States, shall be the supreme law of the land; and the judges in every state shall be bound thereby, anything in the Constitution or laws of any State to the contrary notwithstanding.

Further, in Volume 3, Appendix D, Laws and Regulations Relevant to Forest Planning, on page 385 there is a section regarding the Treaty of 1855. The section quotes the CTUIR Treaty of 1855 but for some reason includes the Nez Perce in the reference. The Treaty of 1855 between the tribes that are now the CTUIR is codified at 12 Stat. 945, and on hunting states "the privilege of hunting, gathering roots and berries and pasturing their stock on unclaimed lands in common with citizens, is also secured to them." The Treaty with the Nez Perce, 12 Stat. 957, states that the tribe reserved "…the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed lands." The language is not very different, but it is important to recognize that each treaty is unique and should be treated as such. DNR recommends quoting the language from the two treaties separately with the appropriate citation to the Statues at Large.

In response to our earlier comments, the DEIS included a sentence that states:

> As a Federal agency, the Forest Service's legal responsibilities are identified in treaties and clarified in statutes, executive orders, and case law enacted and interpreted for the protection and benefit of federally recognized tribes.

This sentence occurs on page 382 of Volume 2, Chapter 3. Unfortunately, the sentence it was to replace is still on page 381, the first sentence in the Tribal and Treaty Resources section. Please include the above quoted language in the final EIS. Also, the uncorrected sentence is in the Forest Plan itself in Part 1, page 64.

The CTUIR DNR appreciates the inclusion of the section on Culturally Significant Foods in Volume 2, Chapter 3, Page 392. However, the section does not include water. Water is one of the First Foods and must be included in the section. Also, DNR would appreciate it if you included the First Foods in order. The second sentence under the section would read:

> These culturally significant foods include water, fish, big game, roots and berries that are used for both ceremonies and subsistence needs.

When you identify culturally significant foods, please reference them all and place them in this order. It is the order they are ceremonially served in the Longhouse.

Cultural Resources:

This EIS does not contain an adequate analysis of cultural resources. First, the document only uses the National Historic Preservation Act for consideration of the resources. The National Environmental Policy Act allows for a much broader consideration of cultural resources, including those that are not place based. A herd of elk or a species of plant may be important cultural resources under NEPA but, lacking a specific footprint, would not be considered under the NHPA. Page 427 of Volume II states, "All alternatives would provide management direction for cultural resources in a manner consistent with the laws, executive orders, and regulations listed previously." Section 110 of the NHPA requires understanding of all of their resources.

The DEIS does not contain the MA 2E lands of the Wallowa-Whitman National Forest which precludes a comprehensive understanding of the cultural resources in that Forest. The current management practices of the Forests in project specific NEPA is to ask tribes to identify properties of religious and cultural significance, a task the CTUIR is unfunded to provide on every single NEPA project on Forest Service lands. The Forest Service must develop a comprehensive plan to address both archaeological sites as well as traditional cultural properties on more than a NEPA specific case-by-case basis. This DEIS is an opportunity to identify areas that will be managed specifically to protect cultural resources. The Malheur National Forest has acknowledged a mining area to protect, the Umatilla National Forest also protects mining areas and a huckleberry gathering area, whereas the Wallowa-Whitman National Forest has not designated any MA 2E in this DEIS. With the limited consideration given to cultural resources, the plan acknowledges that Alternative C will have the lowest potential for damaging cultural resources and that wilderness designations have the best effects on cultural resources.

Table 392 of the DEIS, Volume 2, Chapter 3, Page 427 illustrates problems the forests have with managing cultural resources. The Wallowa-Whitman has found more sites not eligible than eligible. There is no evidence that criteria other than (d) were used in evaluating archaeological sites. The lack of priority assets suggests that heritage resources are really not important to the Wallowa-Whitman and the Umatilla National Forests. When the CTUIR asked what criteria were used to determine if sites were eligible, CTUIR was informed that "all criteria were considered and appropriate consultation was conducted at the time of the determinations" even though some of the decisions were made "many years ago." With the limited communication with Wallowa Whitman on cultural resources, the CTUIR is not confident that these eligibility determinations were made with the appropriate criteria or that consultation occurred.

Table 392. Identified cultural resource sites within the Blue Mountains national forests

National Forest	All Sites	NRHP Eligible Sites	NRHP Ineligible Sites	Unevaluated Sites	NRHP Listed Sites	Priority Assets	Interpreted Sites
MAL	5,125	2,274	399	2,433	19	207	8
UMA	1,914	691	122	1,100	1	7	3
WAW*	4,377	701	753	2,921	2	6	10

* Does not include sites in the Hells Canyon National Recreation Area.

The CTUIR is disappointed in how the Forest Service has responded to our comments on previous iterations of these plans. Cultural resources comments in particular remain unaddressed; no discussion was presented on whether and how the comments have been resolved.

Of particular note, the Forest Service failed to take the opportunity presented by the Forest Plan to consider and identify areas where energy development is and is not appropriate. Such development dramatically impacts cultural and natural resources. In the past we have expressed concerns about proposed developments and were told that the Forest Plan is the best place to

address such concerns. Further, the MA 2E category for Historical Areas is treated differently through the alternatives in the suitability matrix. For instance, in Table A-45, Energy Development is generally suitable under Alternative C, but generally unsuitable under Alternatives B, D, E and F. Also, in Table 25 of the Proposed Revised Land Management Plan, Energy Development is identified as generally unsuitable in MA 2E. Energy development is generally unsuitable in MA 2E.

We have significant concerns regarding the reliance on guidelines rather than standards. The CTUIR requires standards so that we can predict what decisions will be made and the impacts of those decisions. We have found that guidelines are too nebulous and can be adjusted on a project by project basis; this will likely result in impacts to First Foods and other cultural and natural resources.

In Volume 3, Appendix D, under Tribal and Treaty Resources the American Indian Religious Freedom Act (AIRFA) is identified. Please include in this section reference to the Religious Freedom Restoration Act (RFRA), 42 USC §§ 2000bb et seq. RFRA was passed to address, among other things, the legal shortcomings identified in AIRFA.

Elk:

While the DEIS addresses elk security and road densities, it does so with a focus on hunting season security requirements. Elk security is a year round issue with elk summer distribution being effected by spring antler and mushroom hunters and summer recreationists. Elk are being pushed out of traditional summer ranges on Forest lands to lower elevation private range lands in traditional winter range. This displacement has significant social, political and economic impacts. Elk displaced onto private lands are unavailable to tribal hunters exercising treaty retained rights to hunt on “open and unclaimed lands”. More emphasis should be in the DEIS and the Forest Plan to preserve elk security habitat.

Bighorn sheep:

The CTUIR strongly supports the measures in the DEIS to address issues of contact and disease transmission between domestic and wild bighorn sheep. In particular we support the use of a science based risk of contact assessment similar to the Payette protocol. We also appreciate the clear standards and guidelines relative to protection of bighorn sheep. Alternative C appears to provide the greatest level of protection for this important species and we encourage the inclusion of a foray distance of 35 km in the determination of lands suitable for domestic sheep grazing and trailing in the selected alternative. The following comments reflect the work of the CTUIR in collaboration with state and tribal wildlife managers and other advocates for big horn sheep in the region. The language in **bold** is included in the DEIS or Forest Plan.

Any selected alternative should identify and map all habitat that is unsuitable for domestic sheep grazing. All currently unoccupied bighorn sheep habitats should be classified as unsuitable for domestic sheep and goat grazing and trailing in the selected alternative. In order to maintain

viability populations of bighorn sheep, the standards and guidelines for Range Management and Domestic Livestock Grazing must be expanded and clarified. Specifically as follows:

RNG-9 Standard

Domestic sheep or goat grazing shall not be authorized or allowed on lands where effective separation from bighorn sheep cannot be reasonably maintained.

This standard does not define what "effective separation" between domestic and bighorn sheep means. It should clarify that in determining "effective separation" a quantitative risk assessment such as the one referenced in the August 19, 2011 USFS Washington Office Directive from the Deputy Chief, National Forest System, must be used. A qualitative assessment is not good enough.

RNG-10 Standard

The use of domestic goats or sheep for manipulation of vegetation (i.e., noxious weed control, fuels reduction) shall not be authorized or allowed within or adjacent to source habitat for bighorn sheep.

"Source habitat" should be defined in the forest plan glossary.

RNG-11 Standard

The use of recreational pack goats shall not be authorized or allowed within or adjacent to source habitat for bighorn sheep.

"Adjacent" need to be defined. What size buffer will be placed on source habitat? The literature supports 23 km?

How will the public be notified of this restriction? Will be signs be placed at trailheads?

The forest plans should implement a free use permit/registration system requiring activities that minimize risk and control of pack goats at all times (such as highlining or tethering at night).

This would be a cost effective way to make pack goat users implement good practices and make them aware of the risks to bighorn sheep. If such a system is not but in place pack goats should be banned.

This standard should be expanded or a new standard drafted requiring any contact between recreational pack goats and bighorn sheep be reported.

RNG-12 Standard

An effective monitoring program shall be in place to detect presence of bighorn sheep in identified high-risk areas when authorized domestic sheep or goats are present on adjacent or nearby allotments.

What "effective monitoring" is must be defined in the standard or glossary. Fly-overs are the most effective way to monitor. The standard must require that monitoring occur prior to the turn out date. Waiting until the last minute/day before turn out is not enough. The monitoring timeframe should be based on weather and terrain. The Forest Service should coordinate with state agencies on monitoring, sharing data.

How will high-risk areas be identified? This should be modeled and mapped as part of the forest plan revision process and incorporated into the final forest plans.

How will domestic strays be monitored for? If monitoring does not pick up strays then it is not effective.

RNG-13 Guideline

Trailing of domestic sheep or goats should not be authorized or allowed within 7 miles of bighorn sheep home ranges

This should be a standard. "Should" changed to "shall". This is an opportunity for domestic straying.

Standard should require compliance monitoring by the permittee and the Forest Service during trailing activities, this would minimize strays.

Where did the 7 mile distance come from? The separation distance should be biologically justified and ensure that bighorn sheep have minimal risk of contact with domestic sheep. The literature supports a greater distance.

If this distance cannot be obtained, then trucking should be used rather than trailing.

RNG-14 Standard

When effective monitoring has not been conducted for bighorn sheep presence, domestic sheep or goat grazing shall not be authorized.

This standard should be a part of RNG-12; see comments for RNG-12

RNG-15 Standard

Permitted domestic sheep and goats shall be counted onto and off of the allotment by the permittee. A reasonable effort to account for the disposition of any missing sheep must be made by the permittee.

Permitted domestic sheep and goats should be counted on and off using pit tags and an automatic counter. This would also permit the identification of responsible permittee should a stray be found.

This standard must be expanded to define what a reasonable disposition of missing sheep means. The most effective method would be a fly over.

The permittee should be required to develop a written agreement with relevant federal and state wildlife and agricultural agencies (such as the U.S. Fish and Wildlife Service and Oregon Department of Agriculture) that addresses the retrieval and disposition of stray domestic sheep on public lands. E.g. U.S. Fish and Wildlife Service will do a fly over.

The standard must state what will happen to the missing sheep if found. The permittee should be required to coordinate with the Oregon Department of Agriculture to deal with the missing sheep - they are the state agency with authority over domestics.

RNG-16 Standard

When permitted sheep are found to be missing, the Forest Service shall be notified within 24 hours.

The Forest Service is not able to deal with missing sheep. The permittee should also be required to notify the relevant agencies and implement the agreement discussed above.

RNG-17 Standard

Authorized domestic sheep or goats shall be individually marked in a manner that allows immediate identification of ownership at a distance during the grazing season at all times while on NFS lands.

Including this standard in the adopted forest plans is essential to managing viable populations of bighorn sheep across NFS lands in the Blue Mountains. If a sheep is found off allotment it is essential that the responsible permittee can be identified.

RNG-18 Standard

Implement emergency actions when bighorn sheep presence is detected within 7 miles of active domestic sheep or goat grazing or trailing. Actions to be taken shall ensure separation between bighorn sheep and domestic sheep or goats.

The 7 miles distance must be biologically justified in the forest plan analysis; see comments to RNG-13.

An emergency action plan must be part of any EA developed for domestic sheep/goat allotment adjacent to source habitat/core home ranges. This emergency action plan must be incorporated into Annual Operating Instructions (AOI) for grazing allotments and trailing permits

RNG-19 Guideline

To maintain separation, when bighorn sheep are found within 7 miles of an active domestic sheep and goat allotment, implementation of emergency actions for domestic sheep and goat grazing could include:

Reroute (move) domestic sheep or goats to a new routing path that will take them away from the likely bighorn movement; this may involve rerouting within the permitted allotment, movement to a different allotment, or, if the situation cannot otherwise be resolved, moving the permitted sheep off of the national forest until the situation can be resolved.

Inform the appropriate state agency of the bighorn sheep location

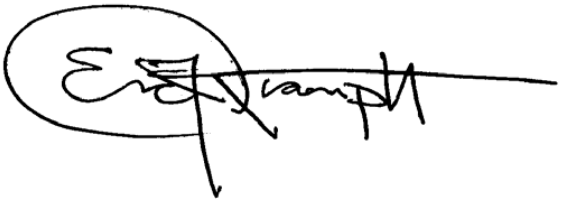
Actions that reroute or move domestics should be considered prior to a state agency taking action. It is Idaho policy and common practice in Oregon to shoot a foraying bighorn sheep ram. Bighorn sheep should not be killed if alternative actions can be taken to ensure that separation is maintained.

New standards should be drafted to address the issue of diseased domestic sheep. The forest plans should contain a standard should require that sick or diseased animals on range be reported to land management or wildlife agency personnel as soon as possible after recognition; after that initial notification, inter-agency coordination should promptly occur. New standards should also be drafted to address stocking of allotments not currently under permit to domestic sheep and goats should only be permitted after an adequate quantitative risk assessment has been completed.

Conclusion

Overall, the document has greatly improved. Due to time constraints we were not able to review every element of the Forest Plan and DNR looks forward to meeting with the Forest Service to discuss our issues, concerns, and recommendations for improving consistency among the Forests in identifying and protecting cultural resources. Thank you.

Sincerely,



Eric Quaempts,
Director Department of Natural Resources

Nez Perce
TRIBAL EXECUTIVE COMMITTEE
P.O. BOX 305 • LAPWAI, IDAHO 83540 • (208) 843-2253

August 15, 2014

Blue Mountains Forest Plan Revision Team
P.O. Box 907
Baker City, Oregon 97814

By Electronic Mail
(http://www.fs.usda/gov/goto/BlueMountainForestP'lanRevisionComments)

Re: Nez Perce Tribe's comments on the Blue Mountains National Forests Proposed Revised Forest Plan and Draft Environmental Impact Statement.

Dear Sir or Madam:

On behalf of the Nez Perce Tribe (Tribe), thank you for the opportunity to comment on the Blue Mountains National Forests Proposed Revised Forest Plan (Forest Plan) and Draft Environmental Impact Statement (DEIS). This letter and the attached comments represent the comments of the Tribe.

As described in the Blue Mountains DEIS, the proposed action is a revision of the land management plans for the Malheur, Umatilla, and Wallowa-Whitman National Forests (collectively referred to as the Blue Mountains). The proposed Forest Plan includes revised goals, objectives, standards; guidelines, suitable uses and activities, management area designations including special areas, and monitoring items. The proposed Forest Plan aims to modernize the existing forest plan so that it will more adequately address present-day forest management issues.

Specifically, the proposed Forest Plan aims to better protect the aquatic and terrestrial environment, manage fuels and fire risk, address climate change, and recognize the interdependency of social and economic components with national forest management. To accomplish these goals, the Forest Plan addresses issues pertaining to ·access, economic and social well-being, livestock grazing and grazing land vegetation, old forest, recommended additions to the national wilderness preservation system, and ecological resilience. Pursuant to these specific issues, the Forest Service developed six alternatives (A-F) from which a preferred alternative was chosen. While the Forest Service has chosen alternative E as its preferred alternative, the Tribe prefers that alternative C is chosen for the final Forest Plan.

As the Forest Service is aware, the Tribe has occupied and used much of the present-day Wallowa Whitman and Umatilla National Forests for subsistence, cultural, religious, and economic purposes since time immemorial. Much of these forests are located within territory subject to the Tribe's 1855 Treaty with the United States, as well as lands the United States, through the Indian Claims Commission, has determined to be the exclusive use and occupancy area of the Tribe. The Tribe has a substantial interest in ensuring that the Forest Service, as an agency of the United States, discharges its responsibilities for management of the National Forests in a manner that fully honors and safeguards the rights the Tribe reserved, and the United States secured, by treaty over 150 years ago before there was a National Forest or States of Oregon and Washington.

The Tribe is also a co-manager of its treaty-reserved resources. Given the Tribe's enormous stake in ensuring that its members may continue to access and exercise treaty rights on the National Forest and other areas within the Tribe's aboriginal territory for future generations, the Tribe devotes substantial time, resources, and effort into restoring fish and their habitat on the National Forest. The Tribe's restoration efforts in Northeast Oregon have rebuilt extirpated fish runs and improved miles of fish habitat through passage improvement, riparian restoration and sediment abatement. These improvements not only benefit the Tribe, but also the general public that reside near or travel to the National Forest.

Following a careful review of the Forest Plan and DEIS, the Tribe concludes that Alternative C, with additional recommendations provided in the attached comments, is the Tribe's preferred alternative because it is most protective of, and consistent with, the Tribe's treaty-reserved rights, interests and priorities. It follows that the Tribe does not support alternative E, the Forest Service's preferred alternative, because, for the reasons discussed in the attached comments, that alternative inadequately protects and advances the Tribe's rights and interests.

The Tribe, by this letter, requests, in accordance with applicable federal laws and executive order, formal consultation with the Forest Service so that the Forest Service may discuss how the Tribe's comments will be addressed sufficiently in advance of any decision the agency makes on the Forest Plan.

Thank you again for the opportunity to comment on this matter. Please contact Michael Lopez, Staff Attorney, Nez Perce Tribe Office of Legal Counsel, at (208) 843-7355 with any questions. The Forest Service is also welcome to contact Rachel Edwards, Executive Assistant, Nez Perce Tribal Executive Committee, at (208) 843-2253 to schedule a consultation.

Sincerely,

Silas C. Whitman
Chairman

NEZ PERCE TRIBE'S COMMENTS ON THE BLUE MOUNTAINS NATIONAL FORESTS PROPOSED REVISED LAND MANAGEMENT PLAN AND DRAFT ENVIRONMENTAL IMPACT STATEMENT

I. GENERAL COMMENTS

a. The Nez Perce Tribe's Interest in the Blue Mountains National Forests Proposed Revised Land Management Plan

Since time immemorial, the Nez Perce Tribe (Tribe) has occupied and used over 13 million acres of land now comprising north-central Idaho, southeast Washington, northeast Oregon, and parts of Montana. Tribal members engaged in fishing, hunting, gathering and pasturing across their vast aboriginal territory, and these activities still play a major role in the subsistence, culture, religion, and economy of the Tribe.

In 1855, the United States entered into a treaty with the Tribe. *Treaty of June 11, 1855 with the Nez Perces*, 12 Stat. 957 (1859). In this treaty the Tribe explicitly reserved, and the United States secured, among other provisions, a permanent homeland as well as, in Article III, " the right to fish at all usual and accustomed places in common with citizens of the Territory; and of erecting temporary buildings for curing, together with the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed lands." *Id*. Article II of the Treaty described the Tribe's exclusive use Reservation: it encompassed all of present day Wallowa County, and includes much of the lands and waters comprising the Wallowa-Whitman and Umatilla National Forests. Article I of the Treaty described the even larger Nez Perce aboriginal territory that was in part ceded, which naturally included, much of the lands and waters of the Umatilla and Wallowa-Whitman National Forests.[3] By contrast, for example, the lands ceded to the west in the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) 1855 Treaty are by definition bounded on the east by the ceded area of the Nez Perce 1855 Treaty, emphasizing the distinct aboriginal territories of respective tribes.

This is important. There are no "joint use" tribal rights within the aboriginal lands that the Nez Perce Tribe alone ceded to the United States under Article I of the Nez Perce Treaty of 1855. Nor are there any "joint use" areas with any other tribe within the lands reserved by the Nez Perce Tribe as its "exclusive use" Reservation in Article II of the Nez Perce Treaty of 1855. And the Tribe's treaty-based boundaries for both homeland and aboriginal territory encompass much of the Umatilla and Wallowa-Whitman National Forests.

The 1855 Walla Walla Treaty Council minutes memorialize this. No other treaty tribes were included within the exclusive Nez Perce Reservation because it was "Nez Perce country": the lands being ceded, and reserved, by the Nez Perce were "their land" and, for example, the three CTUIR tribes instead requested a reservation "in their own country." 18 Ind. Cl. Comm. 1, 110-11 (1967); see Bureau of Indian Affairs, Certified Copy of the Original Minutes of the Official Proceedings at the Council in Walla Walla Valley, which culminated in the Stevens Treaty of 1855, pp. 34-39. The 1967 decision of the Indian Claims Commission (ICC) in its determination of the geographic area of Nez Perce aboriginal title and exclusive use is additionally instructive. The ICC was created by Congress in 1946 to hear claims by Indian tribes for, among other things, inequitable compensation for the taking of aboriginal lands by

[3] The 1863 Nez Perce Treaty by express terms did not abrogate but was instead "supplementary and amendatory" of the 1855 Treaty: it reduced the size of the land reservation, but otherwise preserved "all the provisions" not "specifically changed," including the 1855 Article III fishing rights. 14 Stat. 647, Preface and Article VIII.

the United States. Compensation for aboriginal title required proof of "*actual and exclusive use and occupancy* 'for a long time' prior to the cession, transfer, or loss of the property." 18 Ind. Cl. Comm. 1, 128 (citations omitted).

In its Nez Perce decision, the ICC made comprehensive findings, based on detailed competing anthropological evidence from the Nez Perce Tribe and the United States, of the area of exclusive use and aboriginal ownership of the Nez Perce Tribe. The Nez Perce exclusive use/aboriginal title area found by the ICC includes, and far surpasses, all of present day Wallowa County, and all of the lands and waters of this project area. *Id.* at 117-18. It is notable that even the United States' adversarial expert in the case reported that, for example, Cayuse and other friendly Indians fished in the Wallowa Valley in summer only "by the permission of the Nez Perce," in what was "Nez Perce country." *Id.* at 110; *see also U.S. v. Oregon*, 29 F.3d 481, 487 (9th Cir. 1994) (relying on ICC's 1967 Nez Perce Tribe decision for historical determination of Nez Perce Tribe's 1855 Treaty fishing rights). "Exclusive use" could encompass friendly permission, but it meant the power to exclude. No other tribes were permitted to use the territory the ICC found to have been exclusively Nez Perce.

The ICC concluded its finding of Nez Perce exclusive use in what is now Northeast Oregon by stating, "The Nez Perce were clearly the dominant tribe. Their population was much larger than any of these three tribes to the west. But they were friendly and there was much intermarriage. The Nez Perce had a definite sense of territorial ownership of the lands used and occupied by them." *Id.* at 111. The ICC's finding of exclusive use in Northeast Oregon was one of the several findings that supported its final conclusion: "[T]he Nez Perce Tribe of Indians had exclusively used and occupied continuously for a long time the following described area in the present states of Oregon, Washington and Idaho" – which then describes an area encompassing all of north-central Idaho, northeast Oregon and southeast Washington, naturally including all of present day Wallowa County and all of the lands and waters of this project area. *Id.* at 117-18.

These project lands and waters provide irreplaceable habitat for tribal resources, including Snake River Basin Spring/Summer Chinook salmon, Snake River Basin steelhead. These and other aquatic resources are subject to the exercise of the Tribe's treaty-reserved rights. *See e.g., Sohappy v. Smith, 302 F. Supp. 899 (D. Or. 1969), aff'd, United States v. Oregon, 529 F.2d 570 (9th Cir. 1976); Washington v. Washington State Commercial Passenger Fishing Vessel Ass'n, 443 U.S. 658 (1979) (Fishing Vessel).*

The treaty-reserved right to take fish and other resources reserved by the Tribe presumed the continued existence of those resources. *See Fishing Vessel at 678–79*. Thus, the Treaty secures to the Tribe the continued existence of those biological conditions necessary for the resources that are the subject matter of the treaties. *See Kittitas Reclamation District v. Sunnyside Valley Irrigation District, 763 F.2d 1394 (9th Cir. 1985), cert. denied, Sunnyside Valley Irrigation District v. United States, 474 U.S. 1032 (1985).* Harm to these resources and their habitat will harm the Tribe and its members.

Treaty tribes, such as the Nez Perce, have been recognized as managers of their treaty-reserved resources. *U.S. v. Washington, 384 F. Supp. 312, 339-40, 403 (W.D. Wash. 1974).* As a manager, the Tribe has devoted substantial time, effort, and resources to the recovery and co-management of treaty-reserved resources within its treaty territory.

The lands and waters of the Wallowa-Whitman and Umatilla National Forests are part of the Tribe's vast aboriginal and treaty lands, over which the Tribe has treaty-reserved rights. The proposed Blue Mountains Forest Plan (Forest Plan) and Draft Environmental Impact Statement (DEIS) encompasses a significant part of the Tribe's aboriginal territory, including but not limited to much of the Wallowa-Whitman and Umatilla National Forests. These National Forest System (NFS) lands and waters provide irreplaceable habitat for tribal treaty resources including Spring/Summer Chinook salmon, Endangered Species Act (ESA) threatened steelhead and bull trout, elk, deer, and bighorn sheep.

In reviewing the Forest Plan, the Tribe was disappointed to see that the Tribe's 1855 Treaty (12 Stat. 957) was not explicitly identified or adequately described in the Legal Framework section. Although this section states that "[t]he revised forest plans will continue to honor American Indian reserved rights through consultation and coordination," the Forest Service fails to identify these "reserved rights" as rights reserved in the Tribe's 1855 Treaty with the United States which are "the supreme law of the land" under Article VI (the Supremacy Clause) of the United States Constitution.

In addition, the Tribe was unable to identify <u>any</u> explicit reference or description of the Tribe's 1855 Treaty in the proposed Forest Plan or DEIS. The Tribe observes that the sections in Appendix D labeled "Tribal and Treaty Resources" and "Heritage Program," while identifying some congressional legislation addressing American Indian interests, provides no reference at all to the 1855 Treaty.

Although the Tribe appreciates the Forest Service including a "Tribal Rights and Interest" section in the Forest Plan and "Tribal and Treaty Resources" Section in the DEIS, these sections provide vague and inadequate references to the Tribe's history and treaty rights. The sections also inappropriately lump tribes' treaties together without providing any individual attention or precision to the language of those treaties or their application to the National Forest. The Tribe requests that the Forest Service reflect the Tribe's 1855 Treaty accurately by describing the Article III language, noted above. The Tribe also requests that the Forest Service acknowledge in the document the 1855 Treaty's primacy under the Supremacy Clause of the United States Constitution. Finally, the Tribe asks that the Forest Service recognize and describe the Tribe's unique and legally-protected relationship with the Wallowa-Whitman and Umatilla National Forests as described above.

Moreover, in the Desired Conditions subheading in the "Roads and Trails Access" section in the Forest Plan, the Tribe observes that the document inadequately addresses Tribal access for treaty-reserved purposes. The document states: "[t]he need for tribal access to traditional sites is acknowledged and supported." The Tribe appreciates the agency's acknowledgement and support for tribal access to traditional sites. The tribes' rights to believe, express, and exercise their traditional religions (including having access to sites, use and possession of sacred objects, and the freedom to worship through ceremonial and traditional rights) are also protected by law. The Forest Plan should also include an express acknowledgement of, and support for, access for exercise of treaty-reserved rights. The Tribe requests that the Forest Service include language stating that tribal members exercising treaty rights will be accommodated.

The Forest Service has acknowledged the Tribe and the Forest Service's relationship in memoranda of understandings/agreements including the Memorandum of Agreement between the Forest Service and the Tribe "Establishing a Cooperative Relationship to Facilitate Exercise

of the Treaty Reserved Pasturing Rights set forth in the 1855 Treaty with the Nez Perce Tribe" and the Memorandum of Understanding between the Forest Service and the Tribe waiving camping fees and stay limits.

Finally, under the Social and Economic Well-Being Section in the Forest Plan, the Tribe observes that the Forest Service appears not to take into account the Tribe's participation in and contribution to the economy of the Blue Mountains National Forests. The Tribe sees, for example, that treaty-reserved resources (fish, game, roots and berries, etc.) are not included among the Goods and Services or Forest Products subheadings in the Forest Plan. Instead, the Forest Service characterizes goods and services to include wood for sawmills, forage for livestock, water for irrigation, recreation, and minerals. Moreover, the Social and Economic Well-Being part of the Methodology Section in Appendix B of the DEIS reveals that county economies, but not the Tribe's economy, were the sole metrics considered for the analysis.

As the Forest Service is well aware, the Tribe has a substantial and growing presence in the Blue Mountains National Forests economy. The Tribe's Department of Fisheries Resource Management has an office located in Joseph, Oregon with several tribal and non-tribal employees who reside year-round and seasonally in the area. There are 18 full time employees, most of whom are professional level staff (requiring a college degree), and about seven seasonal technicians working out of the field office. In addition we have four harvest monitors and two Conservation Enforcement officers staying in Joseph area locations during the spring chinook fishing season (these individuals can also be expected to buy goods in the area and the enforcement officers would use lodging as well). The Tribe brings in a number of contracts to do work out of the Joseph Office, totaling about $1.8 million annually. The work includes hatchery production on the Lostine and Imnaha rivers, steelhead and chinook monitoring in the Lostine and Imnaha and tributaries and watershed restoration work throughout Wallowa County. The Tribe requests that the Forest Plan and DEIS consider the Tribe's contributions of millions of dollars to the local Blue Mountains economy through jobs, taxes, goods and services.

b. The National Forest Management Act: The Importance of Standards

The National Forest Management Act (NFMA) guides Forest Service management of the national forests. It sets out both procedural and substantive requirements that the Forest Service must comply with while fulfilling its directive under the Organic Act. Procedurally, NFMA requires the Forest Service to develop forest management plans for every unit of the NFS. National Forest Management Act 16 U.S.C. § 1604(a). These forest management plans set out the specifics for how each forest will comply with NFMA. Substantively, NFMA requires the Forest Service to achieve a number of conservation objectives. 16 U.S.C. §1604(g)(3). NFMA provides the foundation and boundaries for national forest management, while forest plans provide a specific path to accomplish the requirements of NFMA.

The substantive requirements of NFMA require the Forest Plan to contain clear standards and guidelines that "insure" the protection of the environment. 16 U.S.C. §1604 (c). Courts have long held that standards are clear and enforceable requirements. Miller v. U.S., 163 F.3d 591, 594 (9th Cir. 1998). Courts have consistently viewed guidelines as non-enforceable, discretionary regulations. *Id.* But the use of suggestive language like "should" and "may", as opposed to "shall" or "must" is enough for courts to find that a standard or guideline is not a mandatory requirement. Ecology Center v. Castaneda, 574 F.3d 652,661 (9th Cir. 1998). If guidelines supplant standards or if standards contain discretionary or vague language, then the

Forest Service, under the rubric of management flexibility and adaptability, often sacrifices enforceability and accountability to the tribal and general public for the agency's decision-making affecting National Forest lands.

From the Tribe's perspective standards are an extremely important element of the Forest Plan because they are legally required by NFMA, provide legal accountability for actions on the Forest, and increase forest management consistency and predictability. NFMA legally requires standards to be included in forest plans in order to insure environmental and natural resource protection. 16 U.S.C. §1604. Standards also provide accountability on part of the Forest Service to stick with the direction and policies of the Forest Plan. Finally, this accountability creates consistent and predictable management decisions, which are extremely important to resource users and co-managers. While the Tribe understands standards may in some instances limit agency flexibility, the Tribe believes agency accountability, consistency, and predictability overwhelmingly weigh in favor of creating meaningful, enforceable standards.

Given the Forest Service's stated commitment to honoring tribal treaty rights and interests, the Tribe formally requests that the Forest Service include a standard in the Forest Plan that fully reflects this commitment. The current Clearwater National Forest Plan contains the following standard: "Ensure that Forest actions are not detrimental to the protection and preservation of Indian Tribes' religious and cultural sites and practices and treaty rights." The Tribe requests that this same language be included as a standard in the Forest Plan. In addition, since, as the Forest Plan states, treaty rights are often honored through agreements and consultation and coordination with affected Indian tribes, the Forest Plan should also include the following language which is also in the current Clearwater National Forest Plan: "Insure proposed practices and management activities are coordinated with Indian tribes to insure requirements of all laws and regulations are met and terms of Indian Treaties are upheld."

The Tribe believes that incorporating the above language as standards in the Forest Plan will not only greatly assist the Forest Service with honoring its commitment to protecting tribal treaty rights, but also establish a reasonable and consistent framework for Forest Service line officers to coordinate and facilitate the protection of treaty rights into agency decision-making.

c. NEPA

The National Environmental Policy Act (NEPA) is America's basic "charter for protection of the environment." 40 C.F.R. § 1500.l(a). NEPA serves two purposes: (1) "it ensures that the agency, in reaching its decision, will have available, and will carefully consider, detailed information concerning significant environmental impacts," and (2) it "guarantees that the relevant information will be made available" to the public so it may play a role in the decision-making process. *Robertson v. Methow Valley Citizens Council, 490 U.S. 332,349 (1989).*

Under NEPA, federal agencies must take a "hard look" at the environmental consequences of their actions before action is taken. *Blue Mountains Biodiversity Project v. Blackwood, 161 F.3d 1208, 1211 (9th Cir. 1998).* Taking a hard look requires the agency to provide "a reasonably thorough discussion of the significant aspects of the probable environmental consequences." *California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982). The hard look doctrine bars "[g]eneral statements about 'possible effects' and 'some risk' ... absent a justification regarding why more definitive information could not be provided." *Neighbors of Cuddy Mountain v. US. Forest Serv.*, 137 F.3d 1372, 1380 (9th Cir. 1998). This "ensures that important effects will not be

overlooked or underestimated only to be discovered after resources have been committed or the die otherwise cast." *Robertson*, 490 U.S. at 349.

In reviewing the DEIS, the Tribe has concluded that the Forest Service fails to adequately evaluate the Forest Plan's impacts on treaty rights and interests. The Tribe requests that the Forest Service explain in further detail, including providing empirical support in the DEIS, its determination that "[a]ll alternatives ... would provide protection for habitat and watershed conditions that would contribute to species viability at sustainable and harvestable levels." As the Tribe's comments indicate below, the Tribe has several concerns with proposed management as described in the Preferred Alternative that we believe will negatively affect tribal treaty resources in the short and long term.

II. SPECIFIC COMMENTS

a. <u>Fisheries, Aquatic Habitat, and Riparian Areas.</u>

1. Proposed Change From Riparian Habitat Conservation Areas To Riparian Management Areas

The Tribe is concerned with the proposed change of Riparian Habitat Conservation Areas (RHCAs) to Riparian Management Areas (RMAs). This will likely lead to much more active management within these sensitive areas than is scientifically supported and could cause damage to treaty resources. It seems that there is much less ecological justification than the Forest has alluded to in their analysis. One only needs to look to a nearby Forest, also conducting analysis to find much different conclusions. For example, the June 2014 Nez Perce - Clearwater Forest Plan Assessment (Pg. 1-123, 1-124) comes to this conclusion: "*Scientists interested in interactions between fire and the aquatic environment recognize that vegetation treatments may need to take place in some altered ecosystems of the Pacific Northwest, especially considering current and future effects of climate change (Bisson et al. 2003; Noss et al. 2006; Reeves et al. 1995; Rieman and Clayton 1997; Rieman et al. 2000; Everest and Reeves 2007; Luce et al. 2012). Public land managers often display a need for treatment in riparian areas by identifying fuel accumulations and the potential for severe wildfire. To date, justification for treatments in riparian reserves is based on anecdotal information or information gained from studies on forest harvest and forest fire (Stone et al. 2010). Consequently, considerable social and scientific debate occurs regarding the need to treat riparian forests because of Juel accumulation (Rhodes and Baker 2008; Stone et al. 201 OJ. Ecological justification for treatments in riparian reserves has yet to be supported by empirical evidence, because few studies in the literature are specifically designed to address this question (Arkle and Pilliod 2010; Stone et al. 201 OJ.*

Given that the positive and negative impacts of riparian fuel treatments remain largely undocumented in the literature, additional experimental studies of fuel treatment effects on aquatic and riparian ecosystems are needed before generalizations can be made across different forest types and local conditions (Dwire et al. 201 O; Stone et al. 201 OJ. Therefore, ***proposals to treat fuels within riparian reserves should proceed with caution (emphasis added).*** *When developing fuel treatments that consider the aquatic environment, the potential for success may be greater when particularly damaging roads are decommissioned (Rieman and Clayton 1997). Where habitat is less degraded, researchers suggest mimicking natural disturbances, avoiding simplistic treatments, and maintaining a strong focus on*

experimentation and monitoring (Reeves et al. 1995; Rieman and Clayton 1997; Gresswell 1999; Bisson et al. 2003; Luce and Rieman 2010; Arkle and Pilliod 2010)."

Given the above information, and that much of it comes from Forest Service research, it seems that the Forest's desire to create RMAs is premature based on the available science. The Tribe suggests leaving RHCAs in place and conducting further study to determine if a different status is warranted in the future. The Forest should take a much harder look at the proposed change of RHCAs to RMAs before proceeding.

2. RHCAs, Standards, And Guidelines

In Volume 1, pg. 271 of the DEIS the Forests state that *"the most persistent and widespread water quality concern for all three national forests is high stream temperatures during low flows in summer. High summer air temperatures, **changes in stream surface shading caused by Forest Service management activities** (emphasis added), and low flows are important factors contributing to warmer water."* On page 272 of the DEIS the Forests admit that *"Water quality has improved in recent years as a result of changes in management motivated by direction in PACFISH and INFISH, implementation of water quality best management practices (BMPs), direction in the Regional Aquatic Restoration Strategy, fish recovery plans, and through partner investments. Examples include increased emphasis on protecting streamside areas to reduce impacts to shade producing vegetation, repairing and removing unstable roads, and diverting acid mine discharge into off-stream settling ponds.* "Yet, in the development of the forest plan revision the Forests have stepped away from following the direction of PACFISH and INFISH and rather than protecting riparian habitats through RHCAs are attempting to secure measures through designation of RMAs that would allow more active management within these proven sensitive areas. The draft Forest Plan needs to be adjusted to designate riparian areas as RHCAs and the following guidelines need to be changed to standards. Additional standards should be added to the Forest Plan Revision to achieve the direction and intent of PACFISH and INFISH.

3. Timber Management in RHCAs

PACFISH is very clear in prohibiting timber harvest (TM-1), including non-Indian fuelwood cutting in RHCAs except under very limited circumstances caused by catastrophic events and after ecosystem analysis at the watershed scale has been completed. Silvicultural practices for RHCAs may be used to acquire desired vegetation characteristics where needed to attain Riparian Management Objectives. In the proposed Forest Plan, the direction and intent of PACFISH has been marginalized, opening Riparian Habitat Conservation Zones to all manner of manipulation which may harm treaty rights and resources. The following "guidelines" in the Draft Blue Mountain Forest Plan should be changed to "standards" and read as follows:

MA 4B RMA-FOR-1 S-112. STANDARD Timber harvest and thinning **will** occur in RMAs only as necessary to maintain, restore or enhance conditions that are needed to support aquatic and riparian dependent resources.

MA 4B RMA-FOR-3 S-113. STANDARD New landings, designated skid trails, staging or decking **shall** not occur in RMAs, unless there are no reasonable alternatives, in which case they **shall**:

- be of minimum size
- be located outside the active floodplain
- minimize effects to large wood, bank integrity, temperature, and sediment levels

4. Timber Management (General)

The following "guidelines" in the Draft Blue Mountain Forest Plan should be changed to "standards" and read as follows:

FOR-6 S-38 STANDARD Silvicultural treatments **shall** include provisions to avoid detrimental changes in water temperatures, blockages of water courses, and deposits of sediment.

FOR-7 S-39 STANDARD Timber harvest projects **shall** include provisions for the maintenance or restoration of soil and water resources, including protection for streams, **stream banks, shorelines, lakes, wetlands, and other bodies of water.**

FOR-9 S-41 STANDARD Timber harvest **shall** not cause irreversible damage to soil, slope, or other watershed conditions.

5. Roads in RHCAs

PACFISH is very clear in requiring coordination to achieve consistency in road design, operation and maintenance between landowners and other stakeholders. It requires ecosystem analysis prior to construction of new roads or landings in RHCAs. It also requires both road and transportation plans and determination of the influence of each road on Riparian Management Objectives (RMO). In the Draft Blue Mountains Forest Plan, the direction and intent of PACFISH has been marginalized, opening Riparian Habitat Conservation Zones to roading activities which may harm treaty rights and resources. The following "guidelines" in the Draft Blue Mountain Forest Plan should be changed to "standards" and read as follows:

MA 4B RMA-RD-4 S-120. STANDARD Wetlands and unstable areas **shall** be avoided when reconstructing existing roads or constructing new roads and landings. Minimize impacts where avoidance is not practical.

MA 4B RMA-RD-8 S-121. STANDARD Construction or reconstruction of stream crossings **shall** allow passage for other riparian dependent species where connectivity has been identified as an issue.

MA 4B RMA-RD-10 S-123. STANDARD Guideline Hydrologic connectivity and sediment delivery from roads will be minimized. This includes roads inside and outside of riparian management areas.

MA 4B RMA-RD-11 S-124. STANDARD Guideline Road drainage shall be routed away from potentially unstable channels, fills, and hillslopes. This applies both inside and outside of riparian management areas.

To continue to meet the requirements of PACFISH, the following standards need to be **added** to the Draft Blue Mountain Forest Plan:

Standard RF-1. Cooperate with federal, tribal, state, and county agencies and cost-share partners to achieve consistency in road design, operation, and maintenance necessary to attain RMOs.

Standard RF-2. For each existing or planned road, meet the RMOs and avoid adverse effects on aquatic resources as described below:

a. Ecosystem Analysis at the Watershed Scale shall be completed prior to construction of new roads or landings in RHCAs.

b. Road and landing locations in RHCAs shall be minimized.

c. Initiate development and implementation of a Road Management Plan or a Transportation Management Plan. At a minimum, the plan shall address the following items:

- Road design criteria, elements, and standards that govern construction and reconstruction.
- Road management objectives for each road.
- Criteria that govern road operation, maintenance, and management.
- Requirements for pre-, during-, and post-storm inspections and maintenance.
- Regulation of traffic during wet periods to minimize erosion and sediment delivery and accomplish other objectives.
- Implementation and effectiveness of monitoring plans for road stability, drainage, and erosion control.
- Mitigation plans for road failures.

d. A void sediment delivery to streams from the road surface. Outsloping of the roadway surface is preferred, except in cases where outsloping would increase sediment delivery to streams or where outsloping is infeasible or unsafe. Route road drainage away from potentially unstable stream channels, fills, and hillslopes.

e. A void disruption of natural hydrologic flow paths.

f. A void side casting of soils or snow. Side casting of road material is prohibited on road segments within or abutting RHCAs.

Standard RF-3. Determine the influence of each road on RMOs. Meet RMOs and avoid adverse effects on aquatic resources by:

a. Reconstructing road and drainage features that do not meet design criteria or operation and maintenance standards that have been shown to be less effective than designed for

controlling sediment delivery, that retard attainment of RMOs, or that do not protect watersheds from increased sedimentation.

b. Prioritizing reconstruction based on the current and potential damage to aquatic resources and their watersheds, the ecological value of the riparian resources affected, and the feasibility of options such as helicopter logging and road relocation out of RHCAs.

c. Closing and stabilizing or obliterating and stabilizing roads not needed for future management activities. Prioritize these actions based on the current and potential damage to aquatic resources in watersheds and the ecological value of the riparian resources affected.

Standard RF-5. Provide and maintain fish passage at all crossings of existing and potential fish-bearing streams.

6. Livestock Grazing in RHCAs

PACFISH is very clear in modifying or restricting domestic grazing in RHCAs unless they do not retard or prevent attainment of RMOs. In the Forest Plan, the direction and intent of PACFISH has been downgraded, opening Riparian Habitat Conservation Zones to potentially damaging grazing activities which may harm treaty rights and resources. The following "guidelines" in the Draft Blue Mountain Forest Plan should be changed to "standards" and read as follows:

MA 4B RMA-RNG-3 S-116 STANDARD During allotment management planning, **remove** existing livestock handling or management facilities from riparian management areas **that retard or prevent attainment of RMOs or are likely to adversely affect aquatic resources.**

MA 4B RMA-RNG-4 S-117. STANDARD Livestock trailing, bedding, watering, loading, and other handling in riparian management areas **shall** be minimized.

The following "standard" in the Draft Blue Mountain Forest Plan should be changed to read as follows:

MA 4B RMA-RNG-1 S-48 STANDARD New livestock handling and/or management facilities shall be located outside riparian management areas, except for ~~those that inherently must be located in a riparian management area and~~ those needed for resource protection.

To continue to meet the requirements of PACFISH, the following standards need to be **added** to the Draft Blue Mountain Forest Plan:

Standard GM-4. Adjust wild horse and burro management to avoid impacts that prevent attainment of RM Os or adversely affect aquatic resources.

7. Minerals Management in RHCAs

PACFISH is very clear in avoiding adverse impact by mineral operations in RHCAs or critical habitat and requiring a reclamation plan, approved Plan of Operations (or other such governing document), and reclamation bond for those operations that would be located in an RHCA and could affect attainment of RMOs or could adversely affect listed anadromous fish. In the Forest Plan, the direction and intent of PACFISH has been downgraded, opening Riparian Habitat Conservation Zones and critical habitat to potentially damaging operations which may harm

treaty rights and resources. The following "guidelines" in the Draft Blue Mountain Forest Plan should be changed to "standards" and read as follows:

MA 4B RMA-MIN-4 S-130 STANDARD The operating plans for existing activities **shall** be adjusted to minimize adverse effects to aquatic and riparian dependent resources in the **RHCAs**.

To continue to meet the requirements of PACFISH, the following standards need to be **added** to the Draft Blue Mountain Forest Plan:

Standard MM-1. Avoid adverse impacts to listed species and designated critical habitat from mineral operations. If the Notice of Intent indicates that a mineral operation would be located in an RHCA and could affect attainment of RMOs or could adversely affect listed anadromous fish, then require a reclamation plan, approved Plan of Operations (or other such governing document), and reclamation bond. For effects that cannot be avoided, such plans and bonds must address the following items to attain RMOs and avoid adverse effects on listed anadromous fish: the costs of removing facilities, equipment, and materials; recontouring disturbed areas to approximate pre-mining topography; isolating and neutralizing or removing toxic or potentially toxic materials; salvage and replacement of topsoil; and seedbed preparation and revegetation. Ensure Reclamation Plan contain measurable attainment and bond release criteria for each reclamation activity.

Standard MM-2. Locate structures, support facilities, and roads outside RHCAs. Where no alternative to siting facilities in RHCAs exist, locate and construct the facilities in ways that avoid impacts to RHCAs and streams and that avoid adverse effects on aquatic resources. Where no alternative to road construction exists, keep roads to the minimum necessary for the approved mineral activity. Close, obliterate, and revegetate roads no longer required for mineral or land management activities.

Standard MM-3. Prohibit solid and sanitary waste facilities in RHCAs. If no alternative to locating mine waste (waste rock, spent ore, tailings) facilities in RHCAs exists, and if releases can be prevented and stability can be ensured, the:

a. Analyze the waste material using the best conventional sampling methods and analytic techniques to determine its chemical and physical stability characteristics.
b. Locate and design the waste facilities using the best conventional techniques to ensure mass stability and prevent the release of acid or toxic materials. If the best conventional technology is not sufficient to prevent such releases and ensure stability over the long term, prohibit such facilities in RHCAs.
c. Monitor waste and waste facilities to confirm predictions of chemical and physical stability, and make adjustments to operations as needed to avoid adverse effects to aquatic resources and to attain RMOs.
d. Reclaim and monitor waste facilities to assure chemical and physical stability and revegetation, to avoid adverse effects to aquatic resources, and to attain the RMOs.
e. Require reclamation bonds adequate to ensure long-term chemical and physical stability and successful revegetation of mine waste facilities.

Standard MM-4. For leasable minerals, prohibit surface occupancy within RHCAs for oil, gas, and geothermal exploration and development activities where contracts and leases do not already exist, unless there are no other options for location and RMOs can be attained and

adverse effects to aquatic resources can be avoided. Adjust the operating plans of existing contracts to (1) eliminate impacts that prevent attainment of RMOs and (2) avoid adverse effects to native aquatic species.

Standard MM-5. Permit sand and gravel mining and extraction within RHCAs only if no alternatives exist, if the action(s) will not retard or prevent attainment of RMOs, and if adverse effects to native aquatic species can be avoided.

Standard MM-6. Develop inspection, monitoring, and reporting requirements for mineral activities. Evaluate and apply the results of inspection and monitoring to modify mineral plans, leases, or permits as needed to avoid adverse effects on native aquatic species and to eliminate impacts that prevent attainment of RMOs.

8. Fire Management in RHCAs

PACFISH is very clear in design of fuel treatment and fire suppression strategies, practices, and actions so as to not prevent attainment of RMOs and to minimize disturbances of riparian ground cover and vegetation. In the Forest Plan, the direction and intent of PACFISH has been downgraded, opening Riparian Habitat Conservation Zones and critical habitat to potentially damaging operations which may harm treaty rights and resources. The following "guidelines" in the Draft Blue Mountain Forest Plan should be changed to "standards" and read as follows:

MA 4B RMA-FIRE-1 S-104 STANDARD Disturbed areas, such as firelines, drop-points, camps, roads, and trails, shall be restored by actions such as scattering slash piles, replacing logs and boulders, scarifying soils, recontouring terrain, and reseeding with native species.

MA 4B RMA-FIRE-2 S-105 STANDARD Chemicals and retardant **shall** not be used for suppression and mop-up within riparian areas. **An exception may be warranted in situations where overriding immediate safety imperatives exist, or, following a review and recommendation by a resource advisor and a fishery biologist, when the action agency determines an escaped fire would cause more long-term damage to fish habitats than chemical delivery.**

MA 4B RMA-FIRE-5 S-108 STANDARD Temporary firefighting facilities (e.g., incident bases, camps, helibases, staging areas, helispots, and other centers) for incident activities shall be located outside RMAs. When no practical alternative exists, all appropriate measures to maintain, restore, or enhance aquatic and riparian dependent resources shall be used. (See guideline MA4B-RMA-FIRE-1).

MA 4B RMA-FIRE-6 S-109 STANDARD Aerial application of chemical retardant, foam, or other firefighting chemicals and petroleum **shall** be avoided within 300 feet of waterways. **An exception may be warranted in situations where overriding immediate safety imperatives exist, or, following a review and recommendation by a resource advisor and a fishery biologist, when the action agency determines an escaped fire would cause more long-term damage to fish habitats than chemical delivery to surface waters.**

MA 4B RMA-FIRE-7 S-110 STANDARD Water drafting sites **shall** be located and managed to minimize adverse effects on stream channel stability, sedimentation, and in-stream flows needed to maintain riparian resources, channel conditions, and fish habitat.

MA 4B RMA-FIRE-9 S-111 STANDARD ~~General1y,~~ Firelines **shall** be located and configured to minimize sediment delivery, creation of new stream channels, and unauthorized roads and trails. **An exception may be warranted in situations where overriding immediate safety imperatives exist, or, following a review and recommendation by a resource advisor and a fishery biologist, when the action agency determines an escaped fire would cause more long-term damage to fish habitats.**

FIRE-3 S-28 STANDARD Mechanical fireline **shall** not be constructed in areas with greater than 35 percent slope or on highly erodible soils unless potential adverse effects can be mitigated. **An exception may be warranted in situations where overriding immediate safety imperatives exist, or, following a review and recommendation by a resource advisor and a fishery biologist, when the action agency determines an escaped fire would cause more long-term damage to fish habitats.**

To continue to meet the requirements of PACFISH, the following standards need to be added to the Draft Blue Mountain Forest Plan:

STANDARD FM-4 Prescribed burn projects and prescriptions should be designed to contribute to the attainment of the RMOs.

9. Recreation Management in RHCAs

PACFISH is very clear in how the design and maintenance of recreation facilities must not prevent attainment of RMOs and minimize disturbances of riparian ground cover and vegetation. In the Forest Plan, the direction and intent of PACFISH has been downgraded, opening Riparian Habitat Conservation Zones and critical habitat to potentially damaging activities which may harm treaty rights and resources. The following "guidelines" in the Forest Plan should be changed to "standards" and read as follows:

MA 4B RMA-REC-1 S-126 STANDARD ~~Generally,~~ Placing new facilities or infrastructure within expected long-term channel migration zones **shall** be avoided. Where activities, such as the placement or construction of road-stream crossings, boat ramps, docks, and interpretive trails, inherently must occur in RMAs, locate them to minimize impacts on riparian dependent resource conditions (e.g., within geologically stable areas, avoiding major spawning sites).

MA 4B RMA-REC-2 S-127 STANDARD Remove or **relocate** existing recreation facilities that are causing unacceptable impacts in RMAs ~~should be considered~~.

To continue to meet the requirements of PACFISH, the following standards need to be **added** to the proposed Forest Plan:

Standard RM-1. Design, construct, and operate recreation facilities (including trails) and dispersed sites in a manner that does not retard or prevent attainment of RMOs and avoids effects on aquatic resources. Complete Ecosystem Analysis at the Watershed Scale prior to construction of new recreation facilities in RHCAs. For existing recreation facilities inside RHCAs, assure that facilities or use of facilities will not prevent attainment of RMOs or adversely affect native aquatic species. Relocate or close recreation facilities where RMOs cannot be met or adverse effects on aquatic resources cannot be avoided.

Standard RM-2. Adjust dispersed and developed recreation practices that retard or prevent attainment of RMOs or adversely affect aquatic resources. Where adjustment measures such as education, use limitations, traffic control devices, increased maintenance, relocation of facilities, and specific sites closures are not effective in meeting RMOs and avoiding adverse effects on aquatic resources, eliminate the practice or occupancy.

10. Watershed and Habitat Restoration in RHCAs

PACFISH is very clear in cooperation with other stakeholders to develop Coordinated Resource Management Plans, designing projects that promote long term ecological integrity of ecosystems and not using restoration as a substitute for preventing habitat degradation. In the Forest Plan, the direction and intent of PACFISH has been downgraded, opening Riparian Habitat Conservation Zones and critical habitat to potentially damaging operations which may harm treaty rights and resources. To continue to meet the requirements of PACFISH, the following standards need to be **added** to the proposed Forest Plan:

Standard WR-1. Design and implement watershed restoration projects in a manner that promotes the long-term ecological integrity of ecosystems, conserves the genetic integrity of native species, and contributes to attainment of RMOs.

Standard WR-2. Cooperate with federal, state, local, and tribal agencies, and private landowners to develop watershed-based Coordinated Resource Management Plans (CRMPs) or other cooperative agreements to meet RMOs.

Standard WR-3. Do not use planned restoration as a substitute for preventing habitat degradation (i.e. use planned restoration only to mitigate existing problems, not to mitigate the effects of proposed activities).

Standard FW-1. Design and implement fish and wildlife habitat restoration and enhancement actions in a manner that contributes to attainment of the RMOs.

Standard FW-2. Design, construct, and operate fish and wildlife interpretive and other user-enhancement facilities in a manner that does not retard or prevent attainment of RMOs or adversely affect aquatic resources. For existing fish and wildlife interpretive and other user-enhanced facilities inside RHCAs, assure that RMOs are met and adverse effects on aquatic resources are avoided. Where RMOs cannot be met or adverse effects on aquatic resources avoided, relocate or close such facilities.

Standard FW-3. Cooperate with federal, tribal, and state wildlife management agencies to identify and eliminate wild ungulate impacts that prevent attainment of the RMOs or adversely affect listed anadromous and inland native fish.

Standard FW-4. Cooperate with Federal, tribal, and State wildlife management agencies to identify and eliminate wild adverse effects on native anadromous and inland fish associated with habitat manipulation, fish stocking, fish harvest, and poaching.

Standard RA-1. Identify and cooperate with federal, tribal, state, and local governments to secure instream flows needed to maintain riparian resources, channel conditions, and aquatic habitat.

Standard RA-2. Trees may be felled in RHCAs when they pose a safety risk. Keep felled trees on site when needed to meet woody debris objectives.

11. Riparian Habitat - Measurable Objectives

As indicated on page 168 of Volume 3 of the DEIS (and shown below), PACFISH imposed riparian management objectives that are measurable. The preferred alternative lists objectives for riparian habitat and water quality habitat improvement in the form of site, acres, or miles

"restored or improved" by unknown means. The proposed plan does not provide any parameters that can be directly measured to determine the effectiveness of any actions on the Forests. Subsequently, the Forests propose a monitoring plan that poses monitoring questions that cannot be answered since there are no measurable objectives. The Forest Plan needs to be adjusted to include PACFISH RMOs or, if available and scientifically supported, updated tangible and measurable objectives.

PACFISH and INFISH interim riparian management objectives **Habitat Feature**					**Riparian Management Objectives**					
Water Temperature					No measurable increase in maximum water temperature (7-day moving average of daily maximum temperature measured as the average of the maximum daily temperature of the warmest consecutive 7-day period). Maximum water temperatures below 59F within adult holding habitat and below 48F within spawning and rearing habitats.					
Large woody debris (forested systems)					East of Cascade Crest in Oregon, Washington, Idaho: > 20 pieces per mile; > 12 inch diameter; > 35 foot length					
Bank Stability (nonforested systems)					> 80% stable					
Lower Bank Angle (nonforested systems)					> 75% of banks with < 90 degree angle					
Width/Depth Ratio (all systems)					< 10, mean wetted depth divided by mean depth					
Pool Frequency	Wetted width (feet)	10	20	25	50	75	100	125	150	200
	Pools per mile	96	56	47	26	23	18	14	12	9

12. Roads

The preferred alternative includes desired conditions for road density in watersheds with anadromous fish and bull trout. However, to achieve road density reduction goals, the Forests propose a method that only reduces road density on paper and does nothing to address the effects road density actually has on the landscape. The DEIS Volume 1, pg. 73 states *It is assumed that open motor vehicle route density desired conditions would be met by reclassifying maintenance level 2 roads to maintenance level 1 (custodial care) roads through individual*

project planning and decision making. While no road maintenance is expected for maintenance level 1 roads. Standard practice indicates that areas with site specific resource concerns would be treated as necessary." Roads not proposed for designation as a motor vehicle route in the project may have a long-term adverse effects on water quality and treaty resources if they are not properly maintained. Reclassifying roads, removing them from maps, and curtailing any maintenance does not result in fewer roads physically on the landscape which can lead to detrimental effects to the landscape. Existing routes are a primary source of long-term management-related sediment. Road closures and lower maintenance levels would be beneficial to water quality only if the roads are properly decommissioned and well maintained after closure. The Forest Plan needs to be adjusted to either eliminate this false means of reducing road densities or create a standard requiring all roads being classified to a lower maintenance level to receive proper decommissioning prior to reclassification.

13. Priorities

In the existing Forest Plan direction on priorities are clarified for those instances of inevitable conflict during resource management. For example, in the existing 1990 Wallowa-Whitman Forest Plan it states in Chapter 4 under the "Conflicts With Other Uses" section:

> *"Give management and enhancement of water quality, protection of watercourses and streamside management units, and fish habitat priority over uses described in all other management standards or guidelines."*

The Revised Forest Plan as proposed lacks any direction on setting priorities when there is a conflict during management activities. Desired conditions, objectives, and guidelines do NOT set priority or provide for adequate protection of critical aquatic resources. Standards must be set to provide priority and undeniable protection to water quality, protection of riparian areas, and fish habitat.

14. Tiering To Non-NEPA Documents & Lack Of Consultation

Page 100 of the proposed Forest Plan states, "Implementation of the watershed restoration element is tiered to the regional Aquatic Restoration Strategy ... ". The Pacific Northwest Region Aquatic and Riparian Conservation Strategy (ARCS), August 13, 2008 does not appear to have gone through the NEPA analysis and decision process to look at a range of alternatives, consider cumulative impacts, include public involvement, or perform Tribal Consultation. Although the ARCS claims that it is not Forest Plan Direction; it is a regional strategy (ARCS pg. 5), the Region expects that plan components within the ARCS will be included in Forest Plan Revisions "as worded" (ARCS pg. 5). Such a use of anon-NEPA document is inconsistent with NEPA and NFMA.

The DEIS (Volume 1, Chapter 3, pg. 277) states that *"the ARCS as incorporated into the revised forest plan **preserves elements** (emphasis added) of PACFISH/JNFISH."* However, the ARCS has failed to go through ESA consultation. The Forests are short circuiting established Biological Opinions (P ACFISH/INFISH) to implement standards and guidelines that lack proper consultation. This could potentially jeopardize ESA listed species.

If the ARCS is to be used in the revised Forest Plan, it needs to be go through the proper NEPA and Consultation processes PRIOR to the forests tiering their revised Forest Plan to it.

15. Livestock Grazing & Grazing Land Vegetation

In its 1855 Treaty with the United States, the Tribe reserved, and the United States secured to the Tribe, the right to pasture their horses and cattle on open and unclaimed lands, which includes National Forest lands. (The US Forest Service, Wallowa-Whitman National Forest and the Tribe have a Memorandum of Understanding Establishing a Cooperative Relationship to Facilitate Exercise of the Treaty-Reserved Rights set forth in the 1855 Treaty with the Nez Perce Tribe.) These National Forest lands also contain a diversity of resources important to the Tribe. Unfortunately, much of this rangeland is significantly degraded. Current vegetation survey

(CVS) data indicate that 57% of rangeland on the Umatilla National Forest, and 58% of the rangeland on the Wallowa-Whitman National Forest, are in poor condition (Vol. I Table 85). Over a century of mismanagement has led to the poor condition of many grazed areas of the Forests. Though conditions improved somewhat by the end of the 20th century, the management strategy embraced in this DEIS reflects, in large part, the strategy of the 1990 Forest Plan, under which "the trend ... appears static" (Vol. I p. 139). In fact, average rangeland condition under the 1990 Forest Plan declined from 56/100 in the 1990s to 47/100 by 2004 (Vol. I p. 138). Under the preferred alternative, this trend may be expected to continue. Livestock are still allowed to occasionally graze areas deemed unsuited for livestock grazing. Utilization rates are still sampled only as administrative resources permit. The permittees themselves are still generally relied upon to self-report problems as they develop. Policies still provide extensive discretion to managers to remedy resource impacts, or not, as they see fit. CVS data clearly demonstrate that existing policies have resulted in a decline, not improvement, in rangeland condition. Yet the preferred alternative of the DEIS downgrades maximum utilization levels (the sole rangeland standard identified in the 1990 Forest Plan) to mere guidelines and provides no new standards on a range of documented resource concerns associated with livestock grazing.

The Tribe is skeptical that the guidelines identified for the preferred alternative will facilitate progress toward desired future conditions as claimed. For example, the alternatives presented in the DEIS identify varying levels of forage utilization in upland and riparian areas (Vol. I pp. 131- 134). Whichever alternative is implemented, a set of utilization criteria will be used to trigger management changes when maximum utilization levels are reached (Vol. I p. 146).

Unfortunately, this strategy relies entirely on active, continuous monitoring of utilization levels across all active grazing allotments and rapid responses to violations of these thresholds. The Tribe believes that due to continuing budget limitations, the Forest Service is unlikely to be afforded sufficient resources to conduct the extensive and intensive monitoring necessary to ensure compliance with these guidelines. Overutilization of some of the most sensitive upland and riparian areas will therefore almost certainly occur, not as a consequence of the chosen alternative but as a consequence of the manner in which grazing is administered on the Forests. The Tribe recommends that administrative limitations such as this be accounted for either through uniform reductions in allowable utilization across all alternatives or through selection of an alternative with relatively low maximum utilization standards, such as Alternative C. Recommended changes to the guidelines of the preferred alternative follow the next section.

16. Livestock Grazing Suitability

Capability and suitability determinations are used to differentiate livestock stocking rates and use across the various alternatives being considered. However, nowhere in the DEIS are these determinations made available in a spatially explicit format (e.g. Forest-wide maps), precluding the full evaluation of the alternatives with regard to livestock grazing. Furthermore, the actual distribution of active allotments on the Forests appears in only one DEIS figure (Vol. II p. 240, Figure 33), while no map is provided showing the location of vacant allotments. The Tribe requests that a high-resolution map and/or GIS data be made available in the Final Environmental Impact Statement (FEIS) which depicts the extent and distribution of all allotments (active and vacant) and acres deemed suitable for livestock grazing, per alternative, across the Forests.

The Tribe is alarmed to learn that only 42% and 44% of the land within active allotments on the Umatilla National Forest and Wallowa-Whitman National Forest, respectively, is actually classified as suitable for livestock grazing. Though only the suitable acres within each allotment will be used to calculate Animal Unit Months (AUMs), it is very likely that 'limited grazing'

(RNG-4 G-46) will occur on at least portions of the 56-58% of the land within allotments which the Forest has determined is not suitable for livestock grazing, including areas set aside for recreation, threatened and endangered species, and ecosystem health. The flexibility afforded by RNG-4 G-46 is inappropriate given the diversity of important Tribal values and resources associated with areas deemed not suitable for livestock grazing.

The Tribe recognizes that the management of individual allotments is based upon project-level analyses. Nonetheless, the Forest Plan will provide important direction regarding the acres suitable for livestock grazing, stocking rates, protection buffers, utilization standards, and other factors which have long impacted the ecological health of the Forests and region. Only Alternative C provides standards (rather than guidelines) for forage utilization, limits suitable acres to areas most appropriate to livestock use, ensures rapid progress toward rangeland desired future conditions, and contains important controls on domestic sheep grazing and trailing near bighorn sheep home ranges (see the Tribe's separate comments regarding terrestrial wildlife species). On that combined basis, the Tribe supports Alternative C with regard to livestock grazing. As an alternative, recommended changes to the standards and guidelines of the preferred alternative follow this narrative.

The following Standards and Guidelines should be modified as follows and established for the preferred alternative:

RNG-1 G-43 ***Modified.*** **STANDARD** Grazing after wildland fire shall be deferred until vegetation recovers to a condition where grazing will not cause the percent composition of native species to be reduced (cause a downward trend in key species). This generally will be a minimum of 5 years, but could be up to 10 years depending on the extent and severity of the fire and other factors.

RNG-2 G-44. STANDARD New fences **shall** be designed to accommodate wildlife movement.

RNG-3 G-45. STANDARD All new water developments **shall** provide for small mammal and bird escapement.

RNG-4 G-46. STANDARD In areas classified as less than fully capable or suitable, only limited grazing shall be authorized or allowed only after the limitations of the site are considered in designing the site-specific allotment management plan.

RNG-5. STANDARD [Maximum percent utilization of 30% for all departure classes and management systems]

RNG-6 G-47. STANDARD Upland shrub utilization **shall** not exceed **25 percent** as determined by any science-based method.

RNG-7. STANDARD Grazing utilization within occupied greater sage-grouse habitats shall not exceed 40 percent at any time during the grazing season and shall be determined specifically for each greater sage-grouse habitat, i.e., grazing utilization measured as an average of the entire pasture or grazing unit shall not be used to determine compliance with this guideline.

RNG-8. STANDARD During greater sage-grouse breeding season, livestock turnout and trailing shall avoid concentration on known greater sage-grouse leks (protected activity centers).

b. Wildlife and Other Natural Resources

1. General Comments

In general, the Tribe believes that the proposed alternatives fail to encompass a broad array of management strategies with regard to wildlife resources. For example, more restrictive alternatives such as Alternative C would do relatively little to correct coarse-scale departures in historic forest habitat conditions, yet more permissive alternatives such as Alternatives D and E contain very few standards necessary to ensure essential habitat elements and favorable site conditions are maintained during and after active management operations at the project level. Recommended changes to the standards and guidelines of the preferred alternative follow this narrative.

Separately, the Tribe recommends that the distribution of Management Areas from Alternative C be selected for adoption. Land allocations from Alternative C contain a number of elements important for the maintenance of Tribal wildlife resources, particularly the designation of Wildlife Corridors (MA 3C) and the minimization of lands allocated to MA 4A. The Tribe's concerns regarding the extent of MA 4A under the various alternatives are described below as well.

2. Terrestrial Species Viability

The Tribe applauds the deliberative, analytical approach the Forest Service has taken to assess the viability of focal species on the Forests. In principle, we further support the strategy of managing for the historical range of ecological variability (HRV) to support the viability of the widest diversity of native wildlife species historically present on the landscape. Vegetation dynamic development tool models and Bayesian belief networks provide powerful means of assessing historic, current, and future habitat condition and species viability, and their use here has strengthened the overall analysis considerably.

However, the results from these tools indicate that the proposed alternatives all insufficiently promote upward trends in viability for the majority of focal species on the Forests. The DEIS

emphasizes changes in source habitat for a number of focal species, yet those changes represent only one component of the overall viability assessment for each species. Multiple figures illustrate increasing extents of source habitat for many species, yet an overall decrease in viability concern is predicted for only six of23 focal species on the Wallowa-Whitman National Forest and seven of 23 focal species on the Umatilla National Forest, and even then only under a subset of alternatives. For most focal species analyzed and alternatives considered, overall viability is expected to remain static, even for those species with high viability concern. In many cases, increases in source habitat are predicted to be negatively offset by other management elements, including inadequate snag retention, continued livestock grazing, and high road densities.

The Tribe applauds the Forest Service in their use of tools developed on the Payette National Forest to quantify annual risk of contact between bighorn sheep and domestic sheep allotments. As noted previously, the actual distribution of active allotments on the Forests appears in only one DEIS figure (Vol. II p. 240, Figure 33), while no map is provided showing the location of vacant allotments. The Tribe requests that a high-resolution map and/or GIS data be made available in the FEIS which depicts the extent and distribution of all allotments (active and vacant) and acres deemed suitable for livestock grazing, per alternative, across the Forests. Based on supplemental data provided to the Tribe by Forest Service staff, Alternative C classifies as unsuited for domestic sheep grazing areas important for maintaining the long-term viability of bighorn sheep populations, as reflected in Table 318 (Vol. II p. 241). Therefore, the Tribe strongly recommends that the suitability determination of Alternative C be adopted for all alternatives under consideration. The Tribe further recommends that all areas modeled as potential but currently unoccupied bighorn sheep habitat on the Forests be classified as unsuited for domestic sheep grazing to ensure that bighorn sheep populations, a vital resource to the Tribe, are afforded the opportunity to recover toward historic levels.

Assessing annual risk of contact is only one element to a full assessment of bighorn sheep viability on these Forests. The DEIS neither includes nor references analyses regarding risk of extirpation (the ultimate measure of viability), as was utilized on the Payette National Forest, nor does it conduct the viability outcome modeling approach embraced for all other focal species within the Blue Mountains. The Tribe recommends that the background analyses and results used to support the narrative of the DEIS be included in the FEIS.

The Tribe is pleased to see a number of important standards and guidelines specific to bighorn sheep viability shared across all alternatives. However, the Tribe's analysis of domestic sheep grazing practices on another National Forest has identified a number of concerns which may be relevant to the proposed Forest Plan revisions as well:

A. Inadequate monitoring and ineffective responses to violations of LRMP standards can perpetuate resource degradation and corrode confidence in Forest Service management.

B. Because domestic sheep are typically not individually identifiable or counted precisely by Forest Service staff during on/off counts, following scatter events, or periodically during the grazing season, stray domestic sheep are likely to be present on the Forests during and after the grazing season, dramatically increasing disease risk to bighorn sheep populations in the vicinity.

C. The implementation of emergency actions in response to bighorn-domestic contact is essential, yet such actions elsewhere are infrequently triggered, insufficiently executed,

and poorly documented in most cases. This is particularly so when the duty to trigger such actions falls primarily upon the permittees themselves who have substantial incentive to remain silent. An emergency response plan should be considered an essential element of Forest Plan direction associated with bighorn sheep, and its implementation and enforcement should be incorporated explicitly as a standard within the Forest Plan. Recommended changes to the standards and guidelines of the preferred alternative follow this narrative.

3. Canada Lynx

The DEIS identifies early stage seral boreal forest and late-successional forest as important habitats for foraging and reproducing lynx, with focal species representation by the boreal owl and water vole. The DEIS concludes that at the broad scale, viability concerns for boreal owl and water vole are decreasing or low and stable, respectively, and that therefore habitat for lynx is being maintained or is moving toward HRV. On the contrary, the viability concern for boreal owl on the Wallowa-Whitman National Forest and Umatilla National Forest is predicted to be stable or increasing across the proposed alternatives (Tables 300 and 301), and the decadal change in boreal owl source habitat on the Umatilla National Forest is projected to decrease under all alternatives (Figure 20). The DEIS lacks necessary information regarding viability outcomes by alternative for these two focal species or for Canada lynx themselves.

4. Gray Wolf

The Tribe has long supported the reintroduction and health of gray wolf populations in the northern Rockies and Pacific Northwest and recognizes the challenges regarding wolf management in these regions. The Tribe is pleased to note that the Forest Service recognizes the important role of motorized route densities in exposing wolves to human disturbance and harvest. On this basis, the Tribe supports alternatives which minimize the density for open motorized routes yet is troubled by the lack of diversity in desired route densities in the proposed alternative. The Tribe further supports those alternatives, such as Alternatives C, which minimizes the amount of land classified as MA 4A (General Forest) to improve the viability of wolf populations on the Forests. Separately, the Tribe recommends that the distribution of Management Areas from Alternative C be selected for adoption.

An important element influencing the viability of wolves on the Forests which the DEIS does not address is livestock grazing. Wolf pack reductions are commonly justified on the basis of responding to and preventing livestock depredations throughout the region, yet 58-80% of the Forests are currently classified as lands available for grazing by domestic cattle and sheep (Table 84). A direct tradeoff is likely to exist, therefore, between wolf viability and the area made available for permitted livestock grazing on the Forests. On this basis, the Tribe supports Alternative C which minimizes the area of the Forests available for livestock grazing to improve the viability of wolf populations on the Forests. Separately, the Tribe recommends that the distribution of Management Areas from Alternative C be selected for adoption.

5. Wolverine

The Forest Service correctly notes that winter motor vehicle use is an important factor influencing the viability of wolverine on the Wallowa-Whitman National Forest. On that basis, the Tribe supports Alternative C which minimizes the area of the Wallowa-Whitman National Forest available for winter motor vehicle use to improve the viability of wolverine populations

on the Forest. Separately, the Tribe recommends that the distribution of Management Areas from Alternative C be selected for adoption.

6. Sensitive Species

Table 321 identifies 47 Region 6 Sensitive Species known or predicted to occur on the Forests. Of those which occur on the Wallowa-Whitman National Forest, 47% (22 of 47) are expected to be impacted at the individual or habitat level, but not pushed into a downward trend in viability or toward federal listing. For many species, the DEIS relies not on individual assessments but rather on proxy assessments of focal species representing a group of species with similar habitat requirements (Vol. II p. 262). The Tribe recognizes that ecosystem management is intended to move beyond attempts to weigh the (at times competing) needs of multiple species considered individually. Nonetheless, Sensitive Species have been so designated partly due to the failure of other approaches to reflect their needs and statuses.

Sensitive Species identified as 'fine scale' species comprise 38% (18 of 47) of the Sensitive Species identified in Table 321 and therefore receive little additional analysis at the Forest Plan level (Vol. II p. 262). Limited habitat, limited distribution, riparian habitat, and special habitat are discussed thematically, generally in the context of site-specific considerations. Species which occupy narrow habitats such as these are among the most sensitive to management impacts, serving only to emphasize the importance of establishing clear guidance at the Forest Plan level designed to ensure the viability of these species wherever they occur. On that basis, the Tribe supports Alternative C which minimizes the area of the Forests available for livestock grazing in both high-elevation and riparian areas. As an alternative, recommended changes to the standards and guidelines of the preferred alternative follow this narrative.

7. Management Indicator Species (General Comments)

The methodology used to evaluate impacts to Management Indicator Species within the DEIS limits the ability of the reader to "estimate the effects of each alternative on fish and wildlife populations" (36 CFR 219.19(a)(l)). The selection of separate, largely discrete sets of Management Indicator Species for the action and no-action alternatives has resulted in a DEIS in which the planning alternatives are inconsistently "stated and evaluated in terms of both amount and quality of habitat and of animal population trends of the management indicator species" (36 CFR 219.19(a)(2)). Extensive assessments of the American marten, northern three-toed woodpecker, primary excavators, and northern goshawk provide important context for evaluating the no-action alternative yet provide little basis for evaluating the relative impacts of the action alternatives under consideration. Similarly, the failure to assess the impact of the no-action alternative on both white-headed woodpecker and mule deer prevents a meaningful comparison of the alternatives for those species as well. The Tribe recommends that the lists of Management Indicator Species for each Forest be standardized across all alternatives.

The DEIS evaluates impacts to the subset of Management Indicator Species common to all alternatives using separate methodologies and techniques for the no-action and the action alternatives. This approach limits the ability of the reader to compare the relative impacts of all the alternatives under consideration. The Tribe recommends that analyses for each species rely on the same metrics across all alternatives, rather than relying upon 1990 metrics for the no-action alternative.

In addition, two factors limit the ability of the reader to understand the predicted outcomes of the various alternatives: a) the use of actual acreages to evaluate impacts, rather than the percentage of the median HRV as used for Focal Species, and b) the lack of integrative syntheses of the factor-specific analyses currently presented. Predictions that integrate the results of the predictions for all the various factors important to the species of interest should be presented as summaries to the factor-by-factor treatment currently presented.

Analyses indicate that none of the action alternatives on the Wallowa-Whitman National Forest is projected to maintain habitat for pileated woodpeckers within the historic range of variability (Vol. II Fig. 46). This suggests to the Tribe that efforts to restore ponderosa pine habitats within the Wallowa-Whitman National Forest may be overzealous, with reductions to other habitat types below their respective historic ranges of variability. In addition, the discussion regarding Rocky Mountain elk as a Management Indicator Species relies extensively on dated research and standards, which is surprising considering the plethora of scientific advancements made by Forest Service researchers studying the responses of elk to land management specifically within the Blue Mountains region. The Tribe recommends that recent research from staff at the Starkey Experimental Forest and Range be reviewed and incorporated within the FEIS, with edits to the document made as needed to ensure Forest Plan consistency with the best available science.

8. Domestic Livestock Grazing in Relation to Management Indicator Species

Just as the DEIS discusses the impact of domestic livestock grazing to Management Indicator Species within this section as a supplementation to the Rangeland Resource section, the Tribe submits the following comments on such impacts separate from those associated with the Rangeland Resource section.

As the DEIS acknowledges, livestock grazing can have significant impacts to forage quality and availability to elk. Yet as the DEIS only briefly addresses, livestock grazing may have a variety of impacts beyond the direct utilization of available forage, including displacement, fine-scale avoidance, riparian degradation, etc. It is regrettable, therefore, that the narrative presented primarily focuses on the shared utilization of forage and the presumption that forage utilization guidelines alone will maintain habitat for elk across the landscape. In addition, the developed alternatives are virtually uniform with regard to the amount of elk forage areas made available for livestock grazing. Consistent with our comments regarding Rangeland Resources recorded elsewhere, the Tribe recommends that a wider array of alternative livestock management strategies and analyses be developed that more adequately consider all of the impacts of livestock grazing on forage availability for elk, including the factors identified above.

9. Hunted Species

Rocky Mountain elk, bighorn sheep, and a number of other hunted species are very important to the Tribe. As the DEIS notes, not all hunted species are likely to respond in a positive manner to a return to the historical range of habitat variability. It is equally apparent, however, that a number of other plant and wildlife resources important to the Tribe have become depressed through habitat alteration beyond the historic range of variability. The Tribe appreciates the challenge noted by Woolever and quoted on Vol. II page 327. On balance, the Tribe supports the Forest Service's use of HRV as a guide for terrestrial ecosystem management within the Blue Mountains.

Disturbance to big game species from open motor vehicle routes and foraging reductions through livestock grazing both represent negative stressors on wintering big game. On these bases, the Tribe supports Alternative C which minimizes both the amount of land classified as MA 4A

(General Forest) and the land available for livestock grazing on the Forests. Separately, the Tribe recommends that the distribution of Management Areas from Alternative C be selected for adoption.

10. Habitat Connectivity

Habitat connectivity is an important yet underserved component of healthy wildlife populations in the region. As noted in the DEIS, Alternative C contains a number of provisions designed to maintain and enhance such connectivity across the Blue Mountains. On that basis, the Tribe supports Alternative C. Separately, the Tribe recommends that the distribution of Management Areas from Alternative C be selected for adoption.

11. Cumulative Effects

The discussion of cumulative effects presented in the DEIS identifies a number of important factors impacting wildlife populations at a regional scale. Unfortunately, the actual effects of the various alternatives on regional populations are not evaluated. The Tribe recommends that additional analyses be conducted to evaluate the cumulative effects of the proposed alternatives in the context of non-Forest management activities in the region.

12. Climate Change

The discussion of wildlife and climate change presented in the DEIS identifies a number of predicted impacts of a changing climate on wildlife populations. Unfortunately, the actual effects of the various alternatives on regional populations are not evaluated in this context. The Tribe recommends that additional analyses be conducted to evaluate the effects of the proposed alternatives in the context of climate change.

13. Standards and Guidelines for Wildlife and Other Natural Resources Comments

The following Standards and Guidelines should be modified as follows and incorporated into the preferred alternative pursuant to the comments above:

WLD-HAB-1 G-1. STANDARD Management activities that limit the ability of wildlife to disperse between patches of source habitat shall be avoided; area and patch size of late old structure shall be maintained and road density within and between old forest patches shall be maintained or reduced.

WLD-HAB-2 G-2. STANDARD The extent of existing late old structure stands within the moist and cold old forest types that are 300 acres or larger shall not be reduced or fragmented.

WLD-HAB-3 G-3. STANDARD Riparian corridors connecting moist and cold old forest types shall be improved.

WLD-HAB-4. STANDARD Cold and moist late old structure habitats 300 acres or greater and separated by less than 2 miles shall be connected by forested corridors 300 feet wide or wider with a 60 percent or greater canopy cover.

WLD-HAB-5. STANDARD Manage for old age trees so as much old forest structure as possible is sustained over time across the landscape. ~~Sustain a mosaic of vegetation densities (overstory and understory), age classes m1d species composition across the landscape.~~

WLD-HAB-7 G-10. STANDARD Nest disturbing management activities shall not occur within a radius of 1,320 feet from known active goshawk nests between April 1 and August 1.

WLD-HAB-8. STANDARD Establish northern goshawk dispersal post-fledgling family areas in appropriate habitat when current density does not attain a post-fledgling family area every two and one-half miles.

WLD-HAB-9. STANDARD Northern goshawk home range establishment:

a. Post-fledgling family areas **shall** be approximately 600 acres in size. Post-fledgling family areas **shall** include the nest sites and consist of the habitat most likely to be used by the fledglings during their early development.

b. Establish a minimum of three nest areas and three replacement nest areas per post-fledging family area. The nest areas and replacement nest areas **shall** be approximately 30 acres in size. A minimum total of 150 acres of nest areas **shall** be identified within each post-fledgling family area.

c. Nest site selection **shall** be based first on using active nest sites followed by the most recently used historical nest areas. When possible, all historical nest areas **shall** be maintained.

d. Manage for nest replacement sites to attain sufficient quality and size to replace the three suitable nest sites.

WLD-HAB-10 G-11. STANDARD ~~To the extent practical,~~ Known cavity or nest trees **shall** be preserved when conducting prescribed burning (planned ignition) activities, mechanical fuel treatments, and silvicultural treatments.

WLD-HAB-11. STANDARD Manage for breeding areas that will support a minimum of 3 reproductive pairs of pileated woodpeckers per watershed.

WLD-HAB-13 G-16. STANDARD Motor vehicle use within elk winter range **shall** not be authorized or allowed between December 1 and April 30.

WLD-HAB-14. STANDARD In greater sage-grouse habitat, developing new roads, motor vehicle trails, and artificial water impoundments **shall** be avoided. During the breeding season, seasonal closure of open motor vehicle routes within 2 miles of known leks (protected activity centers) **shall** be considered.

WLD-HAB-15. STANDARD Surface occupancy for mineral or fossil fuel exploration or extraction shall not be authorized or allowed within 3 miles of occupied greater sage-grouse leks (protected activity centers).

WLD-HAB-16. STANDARD Power lines, communication towers, meteorological towers, and other tall structures **shall** not be constructed within 2 miles of greater sage-grouse leks (protected activity centers).

WLD-HAB-17. STANDARD Construction of wind turbines **shall** not be authorized or allowed within 3 miles of known greater sage-grouse leks (protected activity centers).

WLD-HAB-18 G-7. STANDARD Bat maternity and ~~roost~~ **hibernation** sites shall not be disturbed.

WLD-HAB-19 G-4. STANDARD Greater than 50 percent of post-fire source habitat **shall** be retained and shall not be salvage logged, except in the wildland urban interface.

WLD-HAB-21 G-6. STANDARD Where salvage logging occurs, all snags 21 inches d.b.h. and greater and 50 percent of the snags from 12 to 21 inches d.b.h. **shall** be retained except for the removal of danger/hazard trees. Snags **shall** be retained in patches.

WLD-HAB-22. STANDARD Following wildfires greater than 10 acres in greater sage-grouse habitat at high risk of annual grass invasions, seeding with an appropriate mixture **of native species shall** be accomplished to reduce the probability of cheatgrass establishment.

WLD-HAB-23. STANDARD Prior to potentially disturbing activities, potential bat sites shall be surveyed to determine presence or absence of bats with a high degree of confidence.

WLD-HAB-24. STANDARD At least one year of survey of the analysis area, including a half mile beyond the boundary prior to activities that modify habitat, shall be completed. Two years of survey shall be accomplished to verify questionable sightings, unconfirmed nest sites, etc. If nesting goshawks are found during the first year of inventory, a second year of inventory is not needed in that territory.

WLD-HAB-25 G-12. STANDARD Where management activities occur within riparian habitat, the quantity, stature, and health of shrubs **shall** not be reduced or degraded.

WLD-HAB-26 G-14. STANDARD Roads and trails **shall** not be constructed within high elevation riparian areas.

WLD-HAB-27 G-15. STANDARD Residual herbaceous vegetation within riparian areas **shall** be maintained at a level adequate to prevent stream bank degradation.

WLD-HAB-28 G-13. STANDARD Vigor and areal extent of seed producing grasses and forbs shall not be reduced.

RNG-9 S-2. STANDARD Domestic sheep or goat grazing shall not be authorized or allowed on lands where effective separation from bighorn sheep, as **defined by a quantitative risk assessment**, cannot be ~~reasonably~~ maintained.

RNG-12. STANDARD An effective monitoring program shall be in place to detect presence of bighorn sheep **and stray domestic sheep** in identified high-risk areas, **based on a quantitative risk assessment**, when authorized domestic sheep or goats are present on adjacent or nearby allotments.

RNG-13. STANDARD Trailing of domestic sheep or goats **shall** not be authorized or allowed within ~~7~~ **[an empirically-derived, scientifically-defensible number of**] miles of bighorn sheep home ranges.

RNG-15. STANDARD Permitted domestic sheep and goats shall be counted onto and off of the allotment by ~~**the permittee**~~ **Forest Service personnel using an automated, reliable**

system which produces a verifiable record of the count. ~~A reasonable effort to~~ **Full accounting** ~~for~~ of the disposition of any missing sheep ~~must~~ **shall** be made ~~by the permittee~~.

RNG-18. STANDARD Implement emergency actions when bighorn sheep presence is detected within ~~7~~ **[an empirically-derived, scientifically-defensible number of**] miles of active domestic sheep or goat grazing or trailing. Actions to be taken shall ensure separation between bighorn sheep and domestic sheep or goats **and be consistent with the emergency response plan**.

RNG-19. STANDARD To maintain separation, when bighorn sheep are found within ~~7~~ **[an empirically-derived, scientifically-defensible number of**] miles of an active domestic sheep and goat allotment, implementation of **the emergency response plan shall occur.** ~~Emergency actions for domestic sheep and goat grazing could include: Reroute (move) domestic sheep or goats to a new routing path that will take them away from the likely bighorn movement; this may involve rerouting within the permitted allotment, movement to a different allotment, or, if the situation cannot otherwise be resolved, moving the permitted sheep off of the national forest until the situation can be resolved.~~ Inform the appropriate state agency of the bighorn sheep location.

NEW RANGE STANDARD Domestic sheep or goat grazing shall not be authorized or allowed in the absence of an emergency response plan designed to maintain and rapidly reestablish separation of at least (an empirically-derived, scientifically-defensible number ofl miles from bighorn sheep.

NEW RANGE STANDARD Stocking of allotments not currently authorized for domestic sheep and goat use shall only be permitted after a complete quantitative risk assessment has been completed.

14. Old Forest

The Tribe is concerned that the proposed alternatives fail to encompass a broad array of management strategies with regard to old forest conditions. For example, more restrictive alternatives such as Alternative C would do relatively little to correct coarse-scale departures in historic forest habitat conditions, yet more permissive alternatives such as Alternatives D and E contain very few standards necessary to ensure that large-diameter trees are maintained during and after active management operations at the project level. Recommended changes to the standards and guidelines of the preferred alternative follow this narrative.

The following Standards and Guidelines should be modified as follows and established for the preferred alternative:

FOR-6 G-38. STANDARD Silvicultural treatments shall include provisions to avoid detrimental changes in water temperatures, blockages of water courses, and deposits of sediment.

FOR-7 G-39. STANDARD Timber harvest projects shall include provisions for the maintenance or restoration of soil and water resources, including protection for streams, stream banks, shorelines, lakes, wetlands, and other bodies of water.

FOR-8 G-40. STANDARD Silvicultural treatments shall be developed through interdisciplinary review that considers multiple use of the general area and ensures that the

harvest systems used are not selected primarily because they give the greatest dollar return or the greatest unit output of timber.

FOR-9 G-41. STANDARD Timber harvest shall not cause irreversible damage to soil, slope, or other watershed conditions.

FOR-10 G-42. STANDARD Timber harvest on lands not suitable for timber production shall occur only to meet multiple-use purposes other than timber production.

OF-1 G-59. STANDARD Management activities within and outside old forest stands shall retain live trees ≥21 inches d.b.h., **except when: - Tree(s) need to be removed to favor hardwood species, such as aspen or cottonwood, or other special plant habitats. - Late seral species, such as grand fir, are competing with large diameter early seral species, such as ponderosa pine. - Tree(s) need to be removed to reduce danger/hazard trees along roads and in developed sites. - A limited amount of old forest trees need to be removed where strategically critical to reinforce and improve effectiveness of fuel reduction in wildland-urban interfaces.**

OF-2. STANDARD New motor vehicle routes **shall** not be constructed in old forest stands.

15. Plant Species And Nonnative Invasive Species

The Tribe is very concerned that the DEIS fails to encompass alternatives which best promote the recovery of the threatened Spalding's catchfly. All existing alternatives would continue to classify the occupied habitat of this species as suitable for livestock grazing. Indeed, the Forest Service expects that the preferred alternative "may effect, and would be likely to adversely affect" Spalding's catchfly (DEIS Vol. II p. 352). The proposed standard regarding seasonal livestock use during the active growth period of Spalding's catchfly (PL-TES-1) allows substantial discretion based on historical use, a weak basis of protection. Proposed guideline PL-TES-4 provides virtually no assurance that utilization will not exceed 30 percent, itself an alarmingly high rate of potential direct utilization of a threatened species. As noted previously, utilization triggers are only effective when active, continuous monitoring of actual rates of use is conducted. The Tribe believes that due to continuing budget limitations, the Forest Service is unlikely to be afforded sufficient resources to conduct the extensive and intensive monitoring necessary to ensure compliance with standards and guidelines specific to this species. The Tribe recommends that all areas containing known Spalding's catchfly populations on the Wallowa-Whitman National Forest be classified as unsuitable for livestock grazing and reclassified as botanical areas, as the Forest Service has proposed (with the Tribe's support) for the Umatilla National Forest.

A number of the sensitive plant species discussed in the DEIS are impacted predominantly by livestock grazing. The Tribe has provided comments elsewhere specific to livestock grazing and grazing land vegetation, which are informed by our interest in the Tribe's Treaty resources and the recovery of rare and culturally-important plant species. Overall, the Tribe supports efforts to minimize the extent and intensity of livestock grazing on the Forests, particularly where the recovery of these plant resources is hindered by continued livestock use and where invasive nonnative species are present or likely to spread. On that basis, the Tribe supports Alternative C. Alternatively, recommended changes to the standards and guidelines of the preferred alternative follow this general narrative.

The following Standards and Guidelines should be modified as follows and established for the preferred alternative:

PL-TES-1. STANDARD Livestock grazing shall not be authorized or allowed during the *Silene spaldingii* active growth period (generally between May 15 and August 30) in pastures that exhibit low departure from the desired condition, ~~unless the grazing management history demonstrates that livestock avoid *Silene spaldingii* occupied habitat~~.

PL-TES-3. STANDARD Domestic livestock grazing **shall** not be authorized or allowed in the fens/bogs sensitive plant habitat groups.

PL-TES-4. STANDARD Maximum forage utilization of key species **shall** not exceed ~~30~~ **15** percent in occupied habitat of threatened, endangered, and sensitive plant species, except where an approved conservation strategy, conservation agreement, or recovery plan approves an alternate use level.

PL-TES-5. STANDARD New water developments and salting **shall** not be authorized or allowed within one-quarter mile of occupied habitat of threatened, endangered, or sensitive plant species.

PL-TES-6. STANDARD Timber harvest and associated vegetation activities **shall** avoid the occupied habitat of threatened, endangered, and sensitive plant species (minimum 100 foot buffer), unless the silvicultural prescription will benefit the species or its habitat.

PL-TES-7. STANDARD Slash piles and other fuels **shall** be managed to avoid the occupied habitat of threatened, endangered, and sensitive plant species (minimum 100 foot buffer).

PL-TES-8. STANDARD Wildland fire (planned and unplanned) suppression lines **shall** not be constructed within occupied habitat of threatened, endangered, and sensitive plant species.

PL-TES-9. STANDARD New road construction **shall** be designed to avoid the occupied habitat of threatened, endangered, and sensitive plant species (minimum 25-foot buffer).

PL-TES-10. STANDARD All new trail construction **shall** be designed to avoid the occupied habitat of threatened, endangered, and sensitive plant species (minimum 25-foot buffer).

PL-TES-11. STANDARD Mining operations shall be authorized or allowed only if activities are planned to avoid threatened, and endangered**, and sensitive** plant species. ~~Sensitive plant species should be avoided to the greatest extent possible.~~

PL-TES-12. STANDARD Land exchanges **shall** avoid the disposition of occupied habitat of threatened, endangered, and sensitive plant species.

c. Cultural Resources

1. General Comments

The Forest Service states that the goals are to return the forest ecosystem to its “historic levels,” or similar terminology. The goal seems to be a return to precontact forest conditions, but the starting point for this is inherently flawed. By starting around 1910, the Forest Service ignores the effects of the previous 50 years of euroamerican logging, homesteading, mining, livestock (especially domestic sheep) grazing, road building, invasive species, and burning.

The Section 2.6 description of cultural resources is adequate, but could benefit from expanded description and definition of traditional cultural properties and sacred sites, especially as Forest Service is emphasizing these resources through consultation. Trails should also be included in the discussion of historic properties, as many existing trails, including the Nez Perce National Historic Trail and the Oregon Trail, are eligible for National Register of Historic Places (NRHP) listing, or already listed.

Sections 2.9 and 2.10 concerning Tribal Rights and Interests and Culturally Significant Foods is a welcome expression of the aspiration of the Forest Service to protect and perpetuate Tribal members continuing use of the landscape and the traditional resources they rely upon. The discussion of MA G2 Nationally Designated Trails omits the Nez Perce National Historical Trail (p 85). The revised Forest Plan must discuss the Nez Perce National Historical Trail. The Cultural Resources Guidelines (CUL-1 G-50, p 128) must require consultation and concurrence with the affected Indian Tribe(s). It is inappropriate to negotiate agreements solely with State Historical Preservation Office (SHPO) Tribal resources (p 128).

2. Forest Plan DEIS

The DEIS avoids substantive discussion of cultural or heritage resources, but states that "Avoidance of cultural resources, consideration of traditional values, and reasonable access through agreements, permits, and recognition of their sovereignty and legal rights are all part of the development and evaluation of the alternatives. As a result, American Indian populations would not be disproportionately impacted by any alternative. (vol 1, p126).

Most of the possible undertakings allowable through this DEIS have the potential to severely impact cultural resources. As a programmatic document, the DEIS does not provide specific enough project activities or locations that can be analyzed by the Tribe for impacts to specific resources. The Forests are far from completing archaeological inventories of possible project lands and inventories for Nez Perce ethnographic resources have yet to begin.

Given this lack of information, it is unclear how the Forest Service can accomplish the goals stated above. If projects are proposed in areas with significant cultural and heritage resources, it is unclear how the Forest Service will ensure that these resources are avoided, much less that the agency will consider traditional values and ensure reasonable access to Tribal members. Again, unless sites are identified early, planners cannot avoid them during alternative development and evaluation.

Past agency practice of simply working around sites often does not work because it highlights locations to the public that possess significant archaeological or biological resources.

Although the DEIS assumes that all cultural and heritage properties will be avoided, and therefore no adverse effects will occur, the Forest Plan (p. 128) provides an exception to Cultural Resources protection, through a programmatic agreement or specific mitigation plan developed in consultation with the appropriate State Historic Preservation Officer.

Although situations may arise when this is an acceptable alternative, the Forest Service must require consultation with and concurrence from the affected Indian Tribe(s). It is inappropriate for the agency to negotiate agreements solely with SHPO Tribal resources. Cultural Resources should be listed as an "outstandingly remarkable values for designated wild and scenic rivers" in each of the three Forests (vol. 3, p 398).

The SHOSHONE-BANNOCK TRIBES

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August 5, 2014

Kent Connaughton
USDA Forest Service, Pacific Northwest Region
1220 SW 3rd Avenue
Portland, OR 97208

The Shoshone-Bannock Tribes (Tribes) is aware that the U.S. Forest Service (FS) is requesting input to identify issues and management opportunities for preparing the Blue Mountains National Forests Proposed Revised Land Management Plan (Plan). We would like to submit the following initial comments in regard to this planning effort and inform the FS that our ancestral lands encompass the planning area. The FS should also be aware that Tribes has an exemption under the Endangered Species Act to harvest listed Snake River spring/summer Chinook salmon located in the Grande Ronde and Imnaha basins. As the Tribes have ancestral ties to the landscape within your planning area and reserved treaty rights under the Fort B1idger Treaty of 1868 (15 Stat. 673) we submit the following comments for your consideration.

Government-to-Government Consultation

As part of coordinating land management actions on the Forest, the Tribes would like the FS to meet with our technical staff as soon as possible to better understand the planning issues and convey our priority rights and interests to the FS. We would also like the plan to have goals and objectives for: 1) government-to-government consultation with the Tribes, 2) standards to ensure management actions are consistent with Treaty and Inherent Rights retained by the Tribes, and 3) management actions that maintain or increase open space and actions that promote high quality habitat for native fish, wildlife, and plant communities. We would also like the FS to develop goals and objectives that provide for quality bighorn sheep, sage grouse and anadromous fish habitat allowing for the expansion and the recovery of threatened, endangered and other special status species within the planning area.

Executive Summary, Legal Framework, Vision, Tribal and Treaty Resources

Under Article 4 of the Treaty with the Eastern Band Shoshoni and Bannock of 1868 (15 Stat. 673), the Tribes *"have the right to hunt on the unoccupied lands of the United States so long as*

game may be found thereon, and so long as peace subsists among the whites and Indians on the borders of the hunting districts". Therefore, it is highly important to the Tribes that this Treaty and off-reservation rights to take subsistence be acknowledge in the Executive Summary, Introduction, Legal Framework, and Vision. More specifically, we would like the Plan state that management of Forest Service lands recognizes and are consistent with the Treaty Rights and interests retained by the Shoshone-Bannock Tribes and that their homeland territories extend into the planning area. The vision should also acknowledge that the FS seeks to maintain and improve consultation with the Tribes on lands held in trusts.

Development on Unoccupied Lands

The FS should develop a desired future condition that perpetually designates and promotes open spaces; and, the maintenance and enhancement of native fish, wildlife, and plant populations. Objectives to this desired future condition should include removal of fencing, surface disturbing activities, development of buildings and structures (e.g., water development projects, power lines, etc.), and agriculture activities within five years of Plan approval. The Tribes support vast open space and landscapes that support abundant populations of native fish, wildlife, and plant species which would provide abundant opportunities for the Tribes to exercise off-reservation treaty 1ights. At the very least, we would like the FS to identify areas where this could occur and/or ways that this desired future condition can be accommodated under the multiple use mandate. One method available at the Federal Level for promoting open space and long-term enhancement of fish & wildlife habitat is the designation of Wilderness and increasing habitat connectivity by reducing development and road density. Habitat connectivity should be evaluated using landscape ecological approach based upon habitat patch metrics such as connectivity, diversity, perimeter to edge ratio, patch size, patch evenness, etc. We would like to see this type of analysis and consideration in the environmental impact statement and plan.

Federal Land Transfers·

We want to inform you of our policy on land tenure adjustments. The Tribes opposes any federal land disposition, sale, or transfer to private entities or state and local governments based upon two fundamental reasons. First, the United States government entered into a solemn treaty with the Shoshone and Bannock tribal peoples in which the Tribes reserved certain off- reservation hunting, fishing, and gathering rights which we continue to exercise on unoccupied lands of the United States. Secondly, the United States, including its federal agencies, have a trust responsibility as established in the Fort Bridger Treaty and other federal laws, policies and executive orders to protect and preserve the rights of Indian tribes, and to consult with the Tribes prior to such land sales or transfers. To better understand our position we have attached our position statement regarding the transfer of federal lands.

Campground Policy & Access

Traditionally, the Shoshone and Bannock peoples were nomadic and migrated throughout the region to sustain their livelihoods. There was no understanding of "permanent settlement" until the United States forced our people to the Fort Hall Reservation. Tribal elders have indicated that when Tribal members went to pursue subsistence there was no boundaries and would freely take subsistence as the need arose. However, federal land managers have since developed campground reservation systems, lotteries and fees limiting Tribal members' access to traditional subsistence opportunities and reduce access when exercising off-reservation rights to hunt, fish, and gather on unoccupied lands. As the Tribes exercises inherent and reserved treaty rights witl1in their own authorities and responsibilities, federal land developed campground fees, access points, reservation systems, and any other fee-based campground services shall not apply to the enrolled members of the Shoshone-Bannock Tribes or agents acting on their behalf to complete work for the Tribal government. This is in accordance with Article IV of the Fort Bridger Treaty, which does not state, nor was it the intent of our leaders at the time of signing, to impose or restrict Tribal members from exercising off-reservations rights; and, provided for through a 'Prohibition of Fees' under the Recreational Enhancement Act, which gives the FS authority to collect such fees. Again, we have attached our positions statement on camping on federal lands.

The Tribes should also be afforded special access accommodations when exercising off-reservation treaty rights to hunt, fish, and gather. Access restrictions now imposed by the Federal government to unoccupied lands were not in the contemplation of the drafters of the Fort Bridger Treaty. Therefore, when necessary access should be accommodated to tribal members exercising off-reservation treaty rights.

Climate Change Policy

We are also greatly concerned with the impacts of climate change and how federal land management actions may be contributing to climate change. Not only does the development of solid minerals, fluid minerals, and energy fragmentation and reduce habitat for wildlife, fish, and native plants, this type of development can contribute to climate change. For example, native plant communities are known to sequester carbon and ameliorate climate. Surface disturbance and occupancy reduces the ability of native plant communities to provide climate regulating ecosystem services. Emissions that result for fluid minerals contributes directly to climate change through increased radiant forcing. Although, these types of actions may seem limited to the region the effects of climate change impact the globe. Therefore, we do not support actions posed by the BLM that contribute to positive radiant forcing. We do support actions that help mitigate the effects of climate change. For example, establishing management actions and objectives to promote climate regulating ecosystem services and maintenance and enhancement of large landscapes dominated by native vegetation. To better help you understand our position on climate change we have attached our Climate Change Policy.

Livestock Grazing

The Tribes have become gravelly concern about disease spread from livestock and subsequent declines of bighorn sheep, not to mention the degradation of native plant communities and spread of invasive plants from excessive livestock grazing. It should also be noted that the potential for disease transmission to bighorn sheep is not limited to domesticated sheep, but cattle as well (Wolfe et. al 2010). As such, the Tribes feels that all alternatives should consider retiring domestic sheep grazing from all grazing allotments within and near (30 mile buffer) suitable habitat (e.g., mountainous areas, cliffs, steep riverbanks, and gullied badlands with appropriate food and water). This would allow bighorn sheep to spread into historic habitat regions and reduce risks of transmission. The bighorn sheep is an iconic and sacred animal species of the Tribes, and there needs to be extreme caution and discretion when considering to allow domestic livestock grazing across its range.

The Tribes cannot support any allotment plan that has the potential for passive, continuous grazing activities in riparian areas because of the likelihood that there will be an adverse impact on the watershed. Passive, continuous grazing means grazing throughout the growth period with little or no effort to control the duration or distribution of livestock use in particular areas. There is often a habitual overuse of the riparian areas, even though there may be abundant forage nearby. The FS should retain the right to require curtailment of grazing activities to protect the riparian area. It is essential that there be responsible stockmanship by the permit holder, and management should require trained range riders to prevent the deterioration of the allotment's riparian areas. Therefore, the Plan should establish goals and objectives to establish active grazing management that entails continual monitoring and animal movement's to avoid or reduce impacts to sensitive areas (e.g., riparian areas, rare plant habitat, etc.).

Native Fish, Wildlife, and Plants

The Tribes have a mission to protect, restore, and enhance native wildlife, fish, and plant resources to support our reserved rights to hunt, fish, and gather. Management should be considerate of avoiding unnecessary disturbances to wildlife, fish, and native plant communities, or adverse loss or degradation of habitat. With that there should be a discussion of the overall goals for native fish, wildlife and plants, as it relates to providing opportunities to the Tribes to harvests native fish, wildlife, and plants. We suggest the following Desired Condition to be incorporated into the planning document.

> **Desired Condition:** Protect, restore, and enhance fish, wildlife, and native plant resources in accordance with the Tribes' unique interests and vested rights. Provide ample opportunities for exercising inherent, indigenous, and treaty protected rights of Tribal members to fair process and the priority right to harvest pursuant to the Fort Bridger Treaty of July 3, 1868 (15 Stat. 673).

There should also be a justification for how the Plan will meet or least not prove adverse to this desired condition.

Ecosystem Services

The Plan needs to provide a methodology for quantifying and valuing native fish, wildlife, plant, and ecosystem service losses and gains that result from management. This methodology is needed to show how services are loss as a result of development and disturbance, as well as how services are gained through proper reclamation, restoration, and management. The metrics developed should also be used as a mechanism to ensure reclamation, restoration, mitigation, and management is adequate. At a minimum there should be metrics developed for biodiversity, carbon sequestration, wild foods, fish & wildlife habitat, medicinal resources, pollinator services, drinking water, aesthetic losses, opportunities for hunting, fishing, and gathering, and spiritual experience. These ecosystem services are highly important to the Tribal people, especially as it relates to fish & game, drinking water, medicines, and maintaining cultural connection with the air, land, and water. We suggest the FS look into the latest literature on assessing ecosystem services and develop a way to consider losses and gains, as well as how to incorporate the concept into restoration, reclamation, mitigation, and management goals and objectives. This is one mechanism for conveying changes in resource conditions overtime during government to government consultation meetings.

Invasive Species

Non-native invasive species are having a profound impact upon the ecosystem and management throughout the West and FS management should not contribute to the spread and proliferation of invasive species, including non-native weeds. Therefore the EIS and Plan, should have a thorough discussion and plan for implementing an effective integrated pest management plan. At a minimum, this plan should consider the following:

- Ways to prevent new infestations
  - Education outreach
  - Signage
- Actions and commitments for early detection of new invaders
  - Trained observers
  - Sampling techniques
  - Monitoring
- Biology of invasive species
  - Growth form and physiology
  - Dispersal vectors
  - Location and extent of invasion
- Feasibility of eradication vs. control
  - Elimination of propagules from seed bank
  - Eradication efficiency
  - Weed decreases/increases over time and control potential
- Eradication and/or Control Strategy
  - Control methods (e.g., herbicide, mechanical, cultural, biological, etc.)
  - Restoration
  - Timelines
  - Monitoring
  - Costs

- Treatment effective and evaluation plan
  - Record keeping actions
  - Adaptive management

Thorough consideration of each individual species biology will help develop a successful integrated pest management plan for the entire planning area. It would also be good to provide a discussion about the need for control/eradication and problems invasive species pose to the ecosystem and other uses of the Forest.

If Forest improvement funds are insufficient to promote the implementation of an effective pest management program, the Tribes suggest development and exploitive use is reduced, reflecting the need for commensurate funding due to degradation from such actions. Individuals, associations, and corporations involved in extractive use of the Forest must bear the burden of recovery, reclamation, and restoration costs make reduce the spread of non-native invasive species that result from their actions.

Special Areas & ***Cultural Resources***

The Tribes would like the FS to consider designating routes utilized by the Indians during Bannock-Paiute War of 1878 as a National Historic Trail System under the National Trails System Act. At a minimum, we would also like to see some type of special designation to protect portions of this trail, especially burial sites and battlegrounds. We would like to have the FS meet with our Language and Culture Preservation Department about how to best handle trail protection and the management of cultural resources.

The Desired Condition for Cultural Resources gives no weight to the Tribes interests in the management of cultural resources and is rather ambiguous in regard to the statement that Traditional Cultural Properties are available for "appropriate use". We suggest the following language be utilized for Desired Condition.

> **Desired Condition:** Significant historic sites are protected and managed to standard as part of the Heritage Program. Prehistoric, Traditional cultural properties, and historic sites of interests to Tribes are protected and managed to standards set by the Heritage Program in consultation, cooperation, and coordination with the Tribes. Knowledge of cultural resources is enhanced by scientific study, consultation with American Indian Tribes, and public understanding of cultural history is enhanced through interpretation and education.

The Shoshone-Bannock Tribes look forward to working with the Forest Service on this Plan and DEIS. Please respond to these comments in a written format, noting where the comments were incorporated or rationale for why they were disregarded. For comments or questions regarding this submission, please contact Cleve Davis at (208) 239-4552 or by email cbdavis@sbtribes.com.

Sincerely,

Nathan Small
Chairman, Fort Hall Business Council
Shoshone-Bannock Tribes

LITERATURE CITED

Wolfe, L.L., B. Diamond, T.R. Spraker, M.A., Sirochman, D.P. Walsh, C.M. Machin, D.J. Bade, M.W. Miller. 2010. A bighorn sheep die-off in southern Colorado involving a Pasteurellaceae strain that may have originated from syntopic cattle. Journal of Wildlife Diseases, 46(4):1262-8.

[**Note**: The following attachments to this letter are available upon request from the planning record]

Attachment 1: Federal Land Transfers Policy
The Shoshone-Bannock Tribes' Position Regarding the Transfer of Federal Lands, July 2005

Attachment 2: Campground Policy
Shoshone-Bannock Tribes Position Statement Regarding Developed Campgrounds on Federal Lands GAME-06-0506

Attachment 3: Climate Change Policy
Resolution No. ENVR-2014-0299

Attachment 4: Snake River Policy Statement
The Policy of the Shoshone-Bannock Tribes Management of Snake River Basin Resources, 1994, Resolution No. GAME-94-1049

State of Oregon

Comments on

Blue Mountains National Forests

Draft Environmental Impact Statement and Proposed Revised Land Management Plan

August 2014

The State of Oregon (hereafter referred to as the State) provides the following comments on the Blue Mountains National Forests Draft Environmental Impact Statement (DEIS) and Proposed Revised Land Management Plan (PRLMP), affecting management of approximately 5.5 million acres in northeastern Oregon and southeastern Washington, including the Malheur, Umatilla, and Wallowa-Whitman National Forests. The State acknowledges and appreciates the amount of work to date in the development of the Blue Mountains National Forests DEIS and PRLMP by the he Forest Service (FS), its interdisciplinary team and others involved in this ambitious undertaking.

The State's comments have been developed with significant contributions from the Oregon Department of Fish and Wildlife (ODFW) and the Oregon Department of Forestry (ODF). ODFW and ODF appreciate the opportunity afforded the State to participate with the FS under the agreement that gives the State cooperating agency status. The mission of ODFW is to protect and enhance Oregon's fish and wildlife and their habitats for use and enjoyment by present and future generations, and the agency has statutory obligations to manage fish and wildlife resources of Oregon. The mission of ODF is to serve the people of Oregon by protecting, managing, and promoting stewardship of Oregon's forests to enhance environmental, economic, and community sustainability.

Overall, while the State has concerns over the DEIS and PRLMP documents as reflected in the comments and suggestions below, Oregon remains supportive of completing the revision of forest plans for the Blue Mountains National Forests. The State's comments tier to the Oregon Board of Forestry's Federal Forest Principles[4] as adopted in July 2014, and also reiterates several issues the State identified during public scoping in 2010. The State has a long history of working with the Blue Mountains FS staff and looks forward to continued work with the FS and other partners to help shape a plan for the Blue Mountains National Forests. In addition, the State will continue to work closely with the FS at the field level within the planning area, to support local forest collaboratives, implement the Northern Blue Mountain Cohesive Wildfire Strategy[5], and provide technical assistance and resources to adjoining private forestland owners.

The following is a summary of the primary issues and concerns the State found in its' review of the Blue Mountains National Forests DEIS and PRLMP *(in no particular order)*:

[4] http://www.oregon.gov/odf/Pages/board/BOF_Subc_Fed_Forests.aspx
[5] http://bluemtnwildfirestrategy.org/

OVER-ARCHING ISSUES

1. **Collaboration and Partnerships.** The State asserts that National Forests should be managed with a clearly defined vision and strategic goals developed and implemented through a collaborative partnership that includes public involvement. The State believes that increasing the scale and pace of forest health restoration on FS managed forests in eastern Oregon will contribute to the health and resiliency of Oregon's dry-side forest ecosystems, communities and economy. The State supports partnerships between federal, state, county, city, tribes, conservation and environmental non-governmental organizations, private forest products and energy business organizations (e.g., Wallowa County Natural Resources Advisory Committee, Blue Mountains Elk Initiative, Blue Mountains Forest Partners, Wallowa-Whitman National Forest Collaborative, Umatilla Forest Collaborative Group). Within the Planning Area, local forest collaboratives have a wealth of local, project-based knowledge, and have been an effective venue to build stakeholder agreement. They have also been effective in providing review/recommendations for forest management activities and have reduced litigation of FS land management actions. The State has invested in collaboration as a governance model and envisions it growing in utility and effectiveness within the timeframe of the PRLMP. Further, various laws require collaboration on the part of the FS, and the agency has engaged this approach to date. However, the DEIS is inadequate in its reflection of the role it sees for collaboration and partnership's in achieving objectives over the life of the Plan.

   The State asserts that management actions occurring on the Blue Mountains National Forests directly and indirectly affect what happens on adjacent private lands. Recognizing that the effects upon forest health, fish, and wildlife are connected to larger landscapes that include other public and private lands—and that actions on one land ownership can affect the other—the State believes the DEIS/ PRLMP should do more to consider how neighboring non-federal landowners and resources (e.g., habitat, fish, wildlife) may be affected when analyzing management alternatives/actions related to forest and watershed health, wild fire, roads, recreation, distribution and abundance of fish and wildlife, and invasive species. (Along those lines, the State also provides additional comments specific to key points and neighboring private lands as noted in other principal issues to follow).

   - ***The State recommends the PRLMP specifically mention and address how the FS will ensure and improve engagement of local collaboratives to achieve the vision of the PRLMP. Specifically, the State believes the FS should identify how the role of collaboratives in advancing projects or other efforts needed to attain "Desired Conditions" as well as how collaboratives could be better engaged to improve efficiency and effectiveness outcomes in project planning, implementation, and monitoring.***
   - ***The State recommends the PRLMP better address how it will ensure, improve, and promote coordination between agencies and partners to address forest, fish, and wildlife issues that extend across land ownership boundaries and jurisdictions (i.e.,***

All-Lands Approach). Specifically, the State recommends PRLMP promote a "no adverse relationship" approach to neighboring non-federal lands.

2. **Planning Rule Conformance**. Given the decade-plus history on this effort, the State understands the FS is using the 1982 Planning Rule as the basis for plan development while also using complementary components from the 2012 Rule. In reviewing the DEIS/PRLMP, the State was not able to distinguish whether the 1982 or 2012 Planning Rule components were used for parts of the plan as discussed in the narrative of the PRLMP. Clearer identification and declaration of planning rule components is necessary for adequate review to determine if the FS is conforming to the National Forest Management Act.

   - ***The State recommends that DEIS/PRLMP, wherever appropriate, declare which specific provisions (including references) of the 1982 and 2012 Planning Rules are being utilized. The State suggests that this would be best provided both in the narrative of PRLMP and in a summary table for quick review.***

3. **Travel Management**. Use of motorized off-highway vehicles (OHV) is a significant issue in the Blue Mountains National Forests. The State recognizes that OHV use has increased since the last Forest Plan, is continuing to increase, and so is the demand for off-road travel areas as well as pressures upon natural resource values. OHV use—especially when unplanned or outside designated routes—can result in resource damage and displacement of wildlife. Further, the Forest Service's capacity to monitor and enforce OHV use / travel management restrictions is inadequate in the face of growing pressures. growth in use and Given this and the road density summaries in the DEIS/PRLMP, the State believes that specific direction related to OHV management, road density, and enforcement of open vs. closed road/trail designations is extremely important to maintaining functional fish and wildlife habitats in the Blue Mountains National Forests. The State understands that the Forest Service is proposing to proceed with travel management decisions being placed at the project level. While potentially effective in a given project area, this approach may miss the broader need to plan at a landscape-wide level as well as the problems that can arise when this broader approach is not taken. The State believes more specificity is needed in the PRLMP to address forest-wide issues and concerns related to travel management. The State also asserts that monitoring of the impacts of this approach are imperative to assess whether the PRLMP is achieving broader aquatic and wildlife objectives.

   - ***The State recommends the PRLMP document a better crosswalk between the PRLMP and FS Travel Management Rule, and that the PRLMP should communicate its implementation across the landscape more clearly. Specifically, the State recommends the PRLMP identify and propose how project-level implementation of travel management will be linked to Plan- and landscape-level goals/objectives and "Desired Conditions".***

- ***The State recommends that monitoring efforts be robust to determine if broader aquatic and wildlife protection objectives are being achieved with project-level implementation of travel management.***

- ***The State recommends that each Blue Mountains National Forest develop Forest-specific plans to fulfill the Travel Management Rule direction and tier to the PRLMP objectives.***

4. "Desired Conditions" and "Standards and Guidelines". The State values management flexibility and discretion in today's context for managing National Forests and is encouraged by the flexibility the PRLMP provides to the local Forest and District staff professionals. To this end, the State supports the "adaptive and active management" philosophy articulated in the PRLMP. The State also recognizes the need for improved site-specific data available to Federal land managers and therefore supports reliance upon "Desired Conditions" as primary management drivers to allow local Forest staff to work in collaboration with partners to develop project-level decisions. However, the State also believes that "Standards and Guidelines" are important PRLMP components to provide measurable objectives and ensure project-level management actions trend toward "Desired Conditions" over the PRLMP's time horizon. Setting forth "Desired Conditions" is not enough to ensure accountability to the public in achieving those conditions and related management objectives, and the State believes reasons exist for concern with the DEIS / PRLMP approach at this point in time.

The State believes it is important to know what the existing condition of the Blue Mountains National Forests is relative to the desired future condition. The State asserts this is not clear in the DEIS/PRLMP. In addition, the standards and guidelines used in past forest plans were instituted for a reason, and the State would like to know whether the underlying reasons have now been addressed or how this will be assured moving forward. In other words, since the goals and/or commitments were made in the last Forest Plan, have the "Standards and Guidelines" that would now be replaced (or the objectives to which they relate) been met? Is the trend in a positive direction? Or is there insufficient data to say, and if so, what assurance does the public have that the FS will meet desired conditions moving forward? The State requests and assessment of monitoring data related to the 1990 Blue Mountains Forests Land and Resource Management Plans "Standards and Guidelines" to provide this important baseline.

Even under the proposed "Desired Conditions" framework, the State believes "Standards and Guidelines" can be useful to target explicit management direction and measurable outcomes when warranted for specific resources. Further, the State notes that although the PRLMP relates to individual Blue Mountains National Forests, the "Standards and Guidelines" related to active management are the same across the Malheur, Umatilla and Wallowa-Whitman National Forests. The State appreciates the guidance provided by this level of "Standards and Guidelines", noting that few have specific and hard targets. The State does find some inconsistency in the ability of the manager to utilize site-specificity in meeting particular "Standards and Guidelines". In

some cases, the lack of this ability is limiting and in other cases it may not yield enough direction to design a management project with a high-level of certainty.

The State appreciates the reconsideration of management direction provided by the "east side screens", which were intended as interim but based on underlying natural resource concerns. In particular, the State recognizes the continued need to maintain and recruit older forests and larger trees across the eastern Oregon landscape, while also recognizing there are more appropriate means of achieving this outcome at the project scale than a "one size fits all" approach of a diameter threshold. The State acknowledges the work of local collaboratives and the science community in providing the first opportunities to evaluate an age threshold as a means to ensure adequate distribution of older forests. The State agrees with the direction in the PRLMP to manage for older forests based on stand and individual tree age and encourages the FS to work with forest collaboratives in determining site-specific project design.

- ***The State recommends drafting "Desired Conditions" with measurable / quantitative targets that correspond to the vision of the Plan; and tier "Standards and Guidelines" in a manner that provides project-level direction and allows for assessment of achievement over the time horizon of the PRLMP. "Desired Conditions" should be detailed enough to gauge overall Plan effectiveness at achieving the vision of the PRLMP.***
- ***The State recommends providing additional clarity to increase management flexibility within some "Standards and Guidelines". Specifically:***
  - ***Develop a specific Standard & Guideline for management of Individual Old Trees within MA 4A General Forest. Remove the site specificity clause of OF-1 G-59 within MA 4A and rely on the 150 year old threshold. Maintain the site specificity component for all other land allocations.***

5. **Monitoring and Evaluation Plan.** The State believes a robust and detailed monitoring strategy, supported by appropriate research, must be implemented and directly connected to an adaptive management feedback loop as a key part of the PRLMP. In particular, the State notes that monitoring of the Standards and Guidelines of the 1990 Plan was not adequate to determine Plan effectiveness for particular fish and wildlife objectives. Given the reliance on "Desired Conditions" and increased management flexibility at the expense of robust "Standards and Guidelines" in the PRLMP, the State asserts that monitoring and evaluation is imperative to assess implementation over the life of the PRLMP.

   The State believes the PRLMP provides only a very general framework for monitoring and evaluation, and lacks sufficient detail to ensure the PRLMP is implemented as intended or whether it is achieving its intended objectives. The State cannot determine if the FS will invest in status and trend monitoring, whether it will coordinate its monitoring with other agencies/partners, or whether there is a commitment to start baseline monitoring needed to detect the effects of management actions and external drivers like climate change. Further, the State believes an opportunity exists to enhance

monitoring efforts through engagement with local forest collaborative groups, state-level partners, and other interests, which should be further identified through the PRLMP.

- ***The State recommends PRLMP provide much more detail and clarification of the monitoring and evaluation strategy within PRLMP, including connections to local collaborative, state or other partner engagement. The FS should consider, through an interagency coordination effort, developing a multi-organizational monitoring/evaluation strategy. Objectives for monitoring should be prioritized and set by interagency needs using a multi-scale approach of analysis, including regional assessments, basin assessments, watershed analysis, and project analysis.***
- ***The State recommends the FS document a commitment to adequately fund and implement the monitoring component of the PRLMP.***

6. **Economic Goals and Outputs.** The State applauds the FS for articulating that the vision of the PRLMP "recognizes that social and economic components cannot be separated from ecological systems." This triple-bottom-line approach is consistent with the Board of Forestry's vision and aligns well with ODF's Federal Forest Principles. The PRLMP, however, seems inconsistent in its approach. The State notes that this social-economic-ecological interconnection is not articulated within the desired conditions language under Goal 1: Promote Ecological Integrity, yet the ecological components are included in the desired conditions of Goal 3: Promote Economic Well-being.

   The State asserts that the PRLMP undersells the contribution of management of Blue Mountains National Forests to local communities and economies. The State believes that the PRLMP must identify and produce a predictable and sustainable level of wood products as well as non-timber resources and values that contribute to social well-being and economic stability of rural communities. The FS should identify where opportunities for timber production and ecological restoration are mutually supportable, as well as what level and average diameter class of trees are likely to be sustained over time as part of achieving "Desired Conditions" across the Blue Mountains Forests. This would allow for improved business planning and stability, targeted business investment, and potential diversification of economic opportunities. Overall, the State believes the PRLMP does not adequately address Issue 2 (Economic and Social Well-being), developed to respond to public comment on the proposed action. Two examples are:

   - Recognition and assessment of FS management to provide adequate work to maintain a viable workforce necessary to carry out management activities.
   - As recognized throughout the PLRMP, fishing, hunting, and wildlife viewing generates economic activity for regions and counties throughout the state. In particular, northeast Oregon serves as an appealing destination for both Oregon residents and out-of-state visitors (nonresidents).

The State appreciates that Goal 3 includes "Desired Conditions" relating to economic measures internal to the FS. In the current context, maximizing outputs from Federal dollars is critical to success at the landscape-scale.

The State notes that the description and "Desired Conditions" for Management Area (MA) 4A General Forest do not include the word "timber". The State also notes that according to the "Desired Conditions", this General Forest allocation is "maintained through ecological processes, as well as management activities." Since this is the only land allocation expressly identified as suitable for timber production, the State asserts that this specific resource should be mentioned in addition to "a variety of…human needs".

- ***The State recommends that DEIS/PRLMP be amended to strengthen the context, breadth of analysis and outputs specific to the fulfilling Goal 3: Promote Economic Well-being, including:***
  - ***Adequately recognizing the relationship between National Forest management and wood products manufacturing in Goal 3.3.1 Forest Products. Suggested revisions include:***
    - ***"Wood products manufacturing remains a primary driver for local economies."***
    - ***"A predictable supply of timber outputs…contributes to maintaining the viability of a local forest products industry."***
    - ***Provide details regarding the sawlog, non-sawlog and biomass components of the current timber harvest.***
- ***The State recommends that there be an explicit use of "predictable and sustainable timber supply" in the description and desired conditions of MA 4A General Forest (p. 91 of PRLMP).***
- ***The State recommends that DEIS/PRLMP include a broader set of social and economic factors for the purposes of analysis and corresponding outputs to complement the array of ecological outputs (i.e., Table 26 of PRLMP). For example:***
  - ***Breakdown of sawlog, non-sawlog and biomass component of the TSPQs.***
  - ***Acres of harvest type (i.e., thinning, variable retention, regeneration).***
  - ***Analysis of impacts of proposed plan to "jobs in the woods" related to habitat restoration (fire resilience, forest health, invasive weeds, aquatic / watershed function)—types, numbers, and contributions of those jobs to economy.***
  - ***Projected impact for available workforce.***
  - ***Contribution of recreation (i.e., fishing, hunting, wildlife viewing, hiking, etc.) to local economies. One resource is a report by ODFW and Travel Oregon; available at ODFW's website: http://www.dfw.state.or.us/agency/docs/Report_5_6_09--Final%20(2).pdf***

AQUATICS AND RIPARIAN HABITAT

7. **Aquatic and Riparian Strategy.** The State appreciates the attention paid to protecting valuable array of aquatic resources in the DEIS/PRLMP. The DEIS/PRLMP makes numerous references to a variety of protection strategies, including the Aquatic Conservation Strategy (ACS), Aquatic Restoration and Conservation Strategy (ARCS), INFISH, and PACFISH. The State believes the DEIS/PRLMP are not clear about which aquatic strategy(s) is being proposed for use in guiding protection of watershed conditions, riparian areas, and aquatic species. The State could not determine what elements of each of those strategies were combined, updated, changed, or deleted to create what is referred to as "a new regional ARCS" in the PRLMP. As such, the State does not currently understand ARCS to a degree adequate to determine our view of the FS's proposed riparian approach.

   The State notes that the multiple components of ARCS (Riparian Management Areas; Key Watersheds; Mid-Scale Analysis; and Watershed Restoration) are the same components of the Aquatic Conservation Strategy in the Northwest Forest Plan, which has been a topic of focus regarding successful implementation of forest management efforts. Based on the information provided in the DEIS/PRLMP, the State assumes that this planning effort is using general regional policy direction for Plan revisions and is thus proposing to use an Aquatic Conservation Strategy without further evaluation within the Planning Area, adjustment or revisiting the scientific rationale. The State notes that PACFISH and INFISH were interim guidelines provided as direction to east-side National Forests. Based on the information included in the draft documents, it appears that the PRLMP would make these interim guidelines permanent, yet the State is not under the impression these or other components of the interim guidelines / screens have undergone public / NEPA review since their interim adoption.

   The State offers that recent science[6] is being used to evaluate the efficacy of different riparian buffers within the context of the Bureau of Land Management (BLM) Western Oregon Planning Process. ODF is also undergoing a Riparian Rule Analysis for private forest lands based on recent scientific findings[7]. The State recognizes that the "Viability Rule" in the 1982 Planning Rule provides specific direction to the FS as opposed to either the BLM or ODF. However, the State is not clear from the DEIS or PRLMP whether use of the 300/150/100-foot riparian buffers are intended to provide additional conservation measures beyond water quality. The State notes that the proposed riparian buffers account for 29% of MA 4A General Forest acres. This constitutes a significant amount of the landbase that reduces the amount of acres available for timber production. In addition, if active vegetation management within riparian areas is completely prohibited—even if carried out for conservation-based or habitat restoration reasons—this could impede attainment of conservation values and limited timber as a restoration by-product. As drafted, the DEIS/PRLMP does not adequately juxtapose the

[6] http://fes.forestry.oregonstate.edu/sites/fes.forestry.oregonstate.edu/files/PDFs/Riparian%20paper%20Jan%2023.pdf
[7] http://www.oregon.gov/odf/privateforests/pages/monitoringripstream.aspx

value-add of the proposed riparian approach or others on the tradeoffs and range of options between conservation and potential timber production.

The State supports the concept of key and priority watersheds in the PRLMP for more accelerated conservation outcomes. However, the State cannot determine what aquatic and riparian management prioritization scheme was used to identify key/priority watersheds in the DEIS/PRLMP. For example, the lists of key/priority watersheds in the DEIS (Volume 3, Appendix B, Tables B-5, B-6, B-7, pp. 331-337) differ from the list included in the project record. The State could also not determine which aquatic focal species were used to identify individual watersheds. Federal- and state-listed aquatic species are facing threats to their populations and/or habitats. Implementation of appropriate conservation measures to address the threats may prevent declines of at-risk species and reverse declines in these resources where possible.

The State supports alternatives that have comprehensive outcomes for maintaining and restoring water quality and quantity to support a healthy ecosystem, as well as protecting and restoring other aquatic and riparian habitat values (e.g., structure and processes/functions, Oregon's native fish and wildlife species). This includes restoring natural recruitment of large wood to stream channels, promoting short- and long-term shade function, sediment and erosional buffering function, thermal heterogeneity, physical habitat complexity, and habitat connectivity. In pursuing these outcomes, the State believes active vegetation management can play a role in achieving desired ecological conditions, as long as management is governed by an overarching riparian / aquatic conservation purpose or directive and associated risks are managed through "Standards and Guidelines" and best management practices that contain measureable objectives at the landscape-level, project-level, and site-specific-level.

- ***The State recommends FS clarify their process for choosing a riparian protection strategy, and more clearly and completely describe the "new regional ARCS" in PRLMP.***
- ***The State recommends PRLMP provide more certainty on how ARCS will achieve the intended desired conditions, including:***
  - ***Communicating more clearly how ARCS will be implemented across the landscape to ensure the PRLMP complies with the federal Clean Water Act and its implementation through State water quality standards and other approaches.***
  - ***Addressing the potential role of and ability for vegetation management in riparian areas to assist in attaining conservation outcomes, where overarching management direction is conservation-driven and timber is allowed as a secondary by-product thereof.***
- ***The State recommends FS clarify their process for selecting Key/Priority watersheds and identify which focal species are used to select each Key/Priority watershed in PRLMP.***

- ***The State recommends that one criteria for selecting Key/Priority watersheds should be the presence of one or more Endangered Species Act (ESA)-listed species or state sensitive species in them.***

➢ ***The State recommends FS provide more certainty on its intended desired conditions for Key/Priority watersheds, and communicate its integration/implementation with the "new regional ARCS" across the landscape more clearly in PRLMP.***

8. Oregon Fish Passage Laws. The State could not find any mention and/or reference to Oregon fish passage laws (Oregon Revised Statute (ORS) 509.580 to 509.910) in the DEIS/PRLMP. The State believes PRLMP must address state fish passage laws. Each crossing of a stream or waterbody containing, or historically containing, native migratory fish could trigger Oregon fish passage laws that require ODFW engagement and approval. Trigger events include installation of structures of relevance to fish passage (e.g., culverts, artificial obstructions), major replacement or upgrade work, a fundamental change in permit status (eg. new water right, renewed hydroelectric license), or abandonment of an artificial obstruction. Further details concerning triggers can be requested from ODFW. The approval includes ODFW review of stream crossings or site-specific details pertaining to stream crossing method, design, timing, location, and placement details. The goal of these fish passage laws is to ensure the steam crossing designs are compliant with ODFW fish passage design criteria, and fish passage is unobstructed at all crossing locations.

➢ ***The State recommends PRLMP best management practices related to roads specify that new, replacement stream-crossing structures will be consistent with ODFW fish passage laws.***

➢ ***Oregon laws regarding fish passage may be found in ORS 509.580 through 910 (http://www.leg.state.or.us/ors/509.html) and in Oregon Administrative Rules (OAR) 635, Division 412 (http://www.tate.or.us/OARs/412.pdf).***

9. ESA Conservation and Recovery Plans. The State cannot determine whether recovery actions for mid-Columbia River Steelhead have been addressed in the PRLMP. The Oregon Middle Columbia River Steelhead Conservation and Recovery Plan (Oregon Mid-C Plan) identifies numerous actions to protect and restore natural ecological processes that support the viability of summer steelhead populations within the Blue Mountains National Forests. The Oregon Mid-C Plan addresses legal requirements for recovery planning under the federal ESA and Oregon's Native Fish Conservation Policy. Perhaps more importantly, in addition to meeting legal requirements, the plan provides an informed, strategic approach to recovery that is based on science, supported by stakeholders, built on existing efforts, and includes new recovery actions. The Oregon Mid-C Plan is linked to an adaptive management framework that will evolve over time with new information, including assessment of the recovery actions taken.

Implementation of the Oregon Mid-C Plan will require the contribution of federal, state, tribal, and local partners.

The State also supports and encourages the FS to integrate recovery strategies and actions into the PRLMP related to recovery plans or related documents for other ESA-listed species. This includes the Draft ESA Recovery Plan for Snake River Spring/Summer Chinook Salmon and Snake River Steelhead and Bull Trout Draft Recovery Plan and other ESA Recovery Plans as they come on-line. Habitat on the Blue Mountains National Forests plays a key role in the protection and restoration of these species.

- ***The State recommends PRLMP integrate and address protection and restoration recovery priorities/actions included in the Oregon Mid-C Plan and other ESA Recovery Plans or related documents to guide landscape-level, project-level, and site-specific actions.***

  - ***The Oregon Mid-C Plan is available at ODFW's website: (http://www.dfw.state.or.us/fish/CRP/mid_columbia_river_plan.asp)***
  - ***The Draft Recovery Plan for Snake River Spring/Summer Chinook Salmon and Steelhead is available at NOAA Fisheries West Coast Region website: http://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/snake_river/current_snake_river_recovery_plan_documents.html***
  - ***The Bull Trout Draft Recovery Plan is available at the U.S. Fish and Wildlife Service Pacific Region website: http://www.fws.gov/pacific/bulltrout/Recovery.html***

10. **Management Indicator Species and Focal Species.** The State supports including Management Indicator Species (MIS) and Focal Species in the PRLMP. However, the State believes there is considerable confusion regarding MIS/Focal Species in DEIS/PRLMP. The State cannot determine whether or not aquatic species have been identified as MIS/Focal Species. For example, there are no aquatic species included in the list of focal and management indicator species (Table 1, page 31) in the PRLMP. However, aquatic focal species are discussed and referred to in other parts of the DEIS/PRLMP. The project record also includes references to aquatic focal species. In many cases, the State also cannot determine how management actions will be directed at maintaining MIS/Focal Species and their habitats. For example, there does not appear to be Fish/Wildlife Emphasis Areas (e.g., Management Areas) designated for MIS/Focal Species in the PRLMP. The PRLMP states that additional information about Focal Species and their conservation strategies is available in the project record, which is not included in the DEIS/PRLMP. Again, federal- and state-listed aquatic species are facing threats to their populations and/or habitats. Implementation of appropriate conservation measures to address the threats may prevent declines of at-risk species and reverse declines in these resources where possible.

- ***The State recommends that PRLMP include aquatic MIS/Focal Species, and that any federally listed or state-sensitive aquatic species be included as MIS.***
  - ***Federally listed aquatic species include: Snake River spring/summer Chinook ESU, Snake River fall Chinook ESU, Lower Snake summer steelhead DPS, mid-Columbia summer steelhead DPS, bull trout DPS, and Snake River Sockeye ESU in Oregon.***
  - ***Western brook lamprey (Lampetra richardsoni) and Pacific lamprey (Lampetra tridentata) are both state vulnerable species, and should also be included as MIS given their unique life history, habitat requirements, state status, and tribal significance. Freshwater mollusks should also be considered for inclusion in this context.***
- ***The State recommends FS communicate more clearly how MIS/Focal Species are used to guide protection and conservation strategies and desired conditions in PRLMP, and also recommends including information about Focal Species and their conservation strategies in PRLMP.***

WILDLAND FIRE

11. Transference of risk to private forestlands. The State recognizes that forest ecosystems in the Blue Mountains experienced more natural wildfire under historical conditions, and that fire as a driver of the ecological health of these systems. Decades of management under fire-exclusion policies have resulted in significant change in condition of federal forests and fire regimes in northeast Oregon. This condition has major implications for a host of resources important to the State, including public safety, adjoining private lands, and habitats. The State believes that restoring fire-tolerant forest landscapes will contribute to providing public health benefits, clean water, fish and wildlife habitat, recreational opportunities, and other crucial ecosystem services. In particular, today's intermixed land ownership patterns require public agencies with different missions to manage wildfire in a coordinated approach. The State is proud to partner with the FS to implement the Blue Mountain Cohesive Wildfire Strategy in the Planning Area. We would like to increase state-federal engagement and coordination in other areas related to use of prescribed fire and wildland fire.

- ***The State recommends including "transference of risk" to adjoining private forestlands under Goal 3.2 Land Ownership (p. 68 of PRLMP). The PRLMP should include context and objectives to reduce the potential for wildfire and insect/disease to cross property lines.***

- ***The State recommends the development of a specific "Standard & Guideline" for snag retention to reduce the transference of risk of wildfire to adjoining private forestlands. Include a site-specificity clause that would allow managers to consider removing a percentage of snags (for both >21" and 12-21" classes) within 500 feet of private forestland.***

- ***The State recommends PRLMP integrate fish and wildlife habitat objectives and mitigation actions into fire restoration/rehabilitation programs and actions intended to manage fuels or salvage burned-over areas.***

WILDLIFE

12. **Big Game Habitat Management Areas.** The largest population of Rocky Mountain Elk in Oregon inhabits the Blue Mountains National Forests. The PRLMP correctly points out that elk are also important both economically and socially within the planning area, and appropriately identifies mule deer and Rocky Mountain elk as MIS. However, the State cannot determine how MIS status for deer/elk is used to guide conservation strategies and desired conditions for deer/elk in the PRLMP. For example, important big game habitats or special management considerations (e.g., road closures) are not specifically identified in the PRLMP.

    The State saw little reference in the PRLMP to the relationship between management actions and subsequent distributions of elk and mule deer on neighboring private lands. The State believes that FS management actions influence the distribution and abundance of deer and elk, and that private landowners are directly affected by management actions occurring on the Blue Mountains National Forests. There appears to be an increase of big game (especially elk) moving from public to private lands. ODFW's ability to achieve big game Management Objectives and help private landowners protect their land from deer and elk damage is largely determined by the extent that habitat can be secured and enhanced on federal lands. Reducing disturbance and improving habitat also tends to keep deer and elk on public land and available to hunters that may not have access to private property. The State believes the PRLMP should include measures that promote security habitats and foraging areas for deer and elk, and addresses road closures, especially in Management Areas (MAs) that are adjacent to private lands or where there is potential to have adverse effects on adjacent private lands.

    The elk nutrition and elk habitat use models can help managers evaluate the nutritional and habitat conditions of Blue Mountains landscapes/alternatives and how likely elk are to use these landscapes. The models also project the effects of land management activities, like road closures and thinning, on elk. The State believes these models represent "best available science" and have the potential to better inform the effects analysis in the DEIS and alternative selection in the PRLMP.

    - ***The State recommends PRLMP include specific Management Area designations for important big game habitats to ensure that specific management actions (e.g., road closures, road density limitations, cover, and forage) will be implemented to improve/enhance habitats across the landscape.***

- ***The State recommends PRLMP include an analysis of how FS management actions will impact the Blue Mountains National Forests' ability to keep deer and elk on public lands (and away creating private land damage), including the role of habitat improvements and road closures.***
- ***The State recommends Blue Mountains Elk Nutrition and Habitat models developed by the FS Pacific Northwest Research Station be utilized in DEIS/PRLMP.***

13. **Bighorn Sheep.** The largest population of Rocky Mountain bighorn sheep in Oregon inhabits the Blue Mountains National Forests. The State is concerned about the risk that domestic sheep may transmit disease(s) to bighorn sheep. Disease can significantly limit bighorn sheep populations.

    - ***The State recommends using "Risk of Contact" model utilized on Payette National Forest to delineate unsuitable rangelands for domestic sheep grazing/trailing in PRLMP.***

14. **Wild Horses.** The State is concerned about wild, free-roaming horses in certain portions of the Blue Mountains National Forests. There is a wild horse management plan on the Malheur National Forest. It is vital that the FS and ODFW work together to achieve desired outcomes on wild horse management.

    - ***The State recommends PRLMP support management of wild, free-roaming horses—including herd reductions—and that management activities related to wild horses should be done in coordination with ODFW to protect the natural ecological balance of all fish and wildlife species.***

15. **Invasive Species.** Invasive plants continue to cause changes in vegetative communities and loss of wildlife habitat and forage, and are a serious threat to the Blue Mountains National Forests, as well as adjacent non-federal lands. The State believes the FS should consider creating and implementing comprehensive invasive species detection, monitoring, and control strategies for FS lands that also consider potential impacts on adjacent private and public lands.

    - ***The State recommends PRLMP include an early detection and rapid response program for new invasive species, and include the full range of tools, such as herbicides and biological agents, to eradicate and/or manage invasive plant species.***
    - ***The State recommends PRLMP integrate and implement current Invasive Plant Treatment EIS's across all three Blue Mountains National Forests.***

OTHER RESOURCES TO CONSIDER

A. Oregon Conservation Strategy. The State supports and encourages the FS to integrate the Oregon Conservation Strategy (OCS) in the PRLMP. The OCS provides an excellent opportunity for aligning the PRLMP with eco-regional and statewide conservation goals. The OCS could be used to help the FS make strategic decisions on conservation issues and for guidance on the types of actions most likely to benefit Oregon's priority species and habitats. The OCS is available at ODFW's website: http://www.dfw.state.or.us/conservationstrategy/

B. ODFW Wildlife Species Management Plans. The State supports and encourages the FS to integrate ODFW wildlife species management plans in the PRLMP. ODFW wildlife species management plans identify important ODFW wildlife management policies and strategies, and could be used by the FS to guide management actions related to specific species, such as Rocky Mountain elk, mule deer, bighorn sheep, wild turkey, and other species. ODFW wildlife species management plans are available at: http://www.dfw.state.or.us/wildlife/management_plans/

C. Centralized Oregon Mapping Products and Analysis Support System. The State supports and encourages the FS to integrate the Centralized Oregon Mapping Products and Analysis Support System (COMPASS) in the PRLMP. COMPASS is the first-of-its-kind online data and planning tool that provides spatial fish and wildlife habitat maps to chart Oregon's crucial habitat landscapes. Some examples of data layers that can be found on COMPASS include aquatic and terrestrial species of concern, terrestrial species of economic and recreational importance, wetlands and riparian areas, priority fish barriers, big game winter range, landscape connectivity and large natural areas, etc. COMPASS can be accessed at ODFW's website: http://www.dfw.state.or.us/maps/compass/index.asp

D. Executive Order 13443: Facilitation of Hunting and Wildlife Conservation. The State encourages the FS to address President Bush's Executive Order in the PRLMP when discussing forest management actions that may affect hunting and fishing opportunities on the Blue Mountains National Forests.

STATE OF WASHINGTON
DEPARTMENT OF FISH AND WILDLIFE
2315 N Discovery Place• Spokane Valley, Washington 99216-1566 • (509) 892-1001 FAX (509) 921-2440

August 14, 2014

Blue Mountains Forest Plan Revision Team
Post Office Box 907
Baker City, Oregon 97814

Forest Plan Revision Team:

The Washington Department of Fish and Wildlife (WDFW) has enjoyed a long standing and valued relationship with the United States Forest Service (USFS) and the Forest Supervisors and staff within the state. In southeast Washington, we regularly work in partnership with the Umatilla National Forest; and that cooperation demonstrated itself during the development of the Blue Mountains Revised Forest Plan and Draft Environmental Impact Statement (DEIS). Forest Supervisor, Mr. Kevin Martin and his staff met with regional WDFW staff and I this spring to provide an overview of both the development process and the document contents and WDFW appreciates the effort and the hard work the USFS and the Umatilla National Forest has put into the development of the Revised Forest Plan and DEIS.

The comments provided by WDFW are designed to assist the Forest Plan Revision Team (FPRT) in improving the document and are also in the context of WDFW's mission: "To preserve, protect and perpetuate fish, wildlife and ecosystems while providing sustainable fish and wildlife recreational and commercial opportunities," within the state of Washington and across all ownerships. Land management decisions on federally owned and managed land affect fish and wildlife species and their habitats and thus can have an impact on our ability to fulfill our mission. This clearly speaks to the need for our continued cooperation and partnership.

WDFW would encourage the FPRT to retain the use of "Standards and Guidelines" as used in the 1990 Forest Management Plans. The use of "Desired Conditions" in the current plan revision and DEIS could be perceived as not providing specific parameters and requirements for action and/or the desire to meet a future condition might never be met but still be acceptable within the plan. Given this, we would recommend that when standards are stated, the word "should" be replaced with "shall." Examples of this will follow in the comments text within specific sections of the document.

Comments on specific sections of the document are as follows:

WILDLIFE

Bighorn Sheep

WDFW, the USFS, and the Oregon Department of Fish and Wildlife (ODFW), have committed considerable amounts of money, time, and other resources to the restoration of bighorn sheep in southeast Washington and northeast Oregon. WDFW greatly appreciates the science based approach outlined in this plan to ensure the continued recovery of this iconic species; particularly efforts to address pack goats and domestic allotments in the proximity of suitable bighorn habitat. The following are suggestions that would further improve the recovery of this species.

The selected alternative should identify and map habitat that is determined to be unsuitable for domestic sheep grazing. Land managers need this tool when making decisions related to restocking or converting allotments. WDFW recommends that currently unoccupied, but available bighorn sheep habitat be classified as unsuitable for domestic sheep grazing in the selected alternative. This will allow for recovery and future population expansion.

Volume 2, Chapter 3, Page 235: The first paragraph under the Bighorn Sheep title references historic Rocky Mountain bighorn distribution. This citation fails to capture that Rocky Mountain bighorn sheep historically resided in southeast Washington, and should be corrected to reference Washington's role in historic population distribution.

Volume 2, Chapter 3, Page 237; Table 315: should be corrected to show that the Wenaha herd also resides in Washington. This herd uses Washington summer range extensively in Crooked Creek and Butte Creek. Washington shares management authority over this herd with Oregon and this should be properly reflected.

Volume 2, Chapter 3, Page 241: The information on this table indicates that the model predicts one bighorn sheep to domestic sheep contact per 100 years for the Wenaha and slightly less for the Black Butte herd. These herds are separated by a minimum of 11 and 12 miles, respectively (Table 317 and 318). Although we support the quantitative approach to assessing risk, there are limitations to that method which could be improved upon by utilizing additional measures. For example, the North End allotment was stocked in 2013 for the first time in many years with a new permittee. In March of 2014, 2 domestic sheep strays turned up north of the allotment in the Wenaha-Tucannon Wilderness area, within the core range of the Wenaha bighorn sheep herd. It is possible that these strays originated from the North End allotment, and some formal measures should be identified to reduce the risk of contact in future years. WDFW recommends the FPRT incorporate the following standards into the plan to ensure prevention measures and response measures are adequate to prevent contact between bighorn sheep and domestic sheep and goats.

RNG-9: Standard

Domestic sheep or goat grazing shall not be authorized or allowed on lands where effective separation from bighorn sheep cannot be reasonably maintained.

This standard does not define what "effective separation" between domestic and bighorn sheep means. It should clarify that in determining "effective separation" a quantitative risk assessment such as the one referenced in the August 19, 2011 USFS Washington Office Directive from the Deputy Chief, National Forest System, must be used.

RNG-11: Standard

The use of recreational pack goats shall not be authorized or allowed within or adjacent to source habitat for bighorn sheep.

Defining adjacency needs to be addressed through a quantitative approach, such as incorporating the O'Brien et al. methodology (Incorporating foray behavior into models estimating contact risk between bighorn sheep and areas occupied by domestic sheep. 2014. Wildlife Society Bulletin. 3 8(2) 321-331).

RNG-12: Standard

An effective monitoring program shall be in place to detect presence of bighorn sheep in identified high-risk areas when authorized domestic sheep or goats are present on adjacent or nearby allotments.

WDFW recommends that you define "effective monitoring." The standard should require that monitoring occur prior to the turn out date of domestic sheep or goats. The monitoring timeframe should be based on weather and terrain. The Forest Service should coordinate with both Oregon and Washington respective state agencies on monitoring and data sharing.

We also recommend that high-risk areas be identified and that they be modeled and mapped as part of the forest plan revision process and incorporated into the final forest plans.

Lastly, an effective monitoring program should describe how domestic strays will be monitored.

RNG-13: Guideline

Trailing of domestic sheep or goats should not be authorized or allowed within 7 miles of bighorn sheep home ranges

WDFW recommends that this Guideline be changed to a Standard, and that the word "should" be replaced with "shall".

WDFW was unable to determine where the 7 mile figure originated. The separation distance should be biologically justified, such as quantifying foray distances, contact probabilities, and connectivity of suitable habitat between domestic locations and bighorn sheep herds.

RNG-15: Standard

Permitted domestic sheep and goats shall be counted onto and off of the allotment by the permittee. A reasonable effort to account for the disposition of any missing sheep must be made by the permittee.

WDFW recommends that all sheep permitted to be on the forest be marked in a manner that is identifiable from a reasonable distance. The ability to quickly react to a stray in bighorn sheep suitable habitat should not be hindered by ownership or identification questions.

WDFW also recommends that a new Standard be created that formalizes a response plan for each active domestic sheep allotment. This response plan would be utilized when strays move into bighorn sheep areas or when bighorn sheep disperse into the proximity of an occupied allotment. The response plan should identify personnel, agencies, and funding availability to quickly respond to a "contact" situation. Any plan should recognize the urgent nature of these contact situations and minimize delays that might reduce the opportunity to prevent potential contact. WDFW will readily work with the USFS, to review any response plan for allotments that affect Washington bighorn sheep herds (Black Butte, Mountain View, and Wenaha).

RNG-17: Standard

Authorized domestic sheep or goats shall be individually marked in a manner that allows immediate identification of ownership at a distance during the grazing season at all times while on NFS lands.

Including this standard in the adopted forest plans is essential to managing viable populations of bighorn sheep across NFS lands in the Blue Mountains. If a domestic sheep is located off an allotment, it is essential that the responsible permittee can be identified.

RNG-18: Standard

Implement emergency actions when bighorn sheep presence is detected within 7 miles of active domestic sheep or goat grazing or trailing. Actions to be taken shall ensure separation between bighorn sheep and domestic sheep or goats.
WDFW recommends that the 7 miles distance must be biologically justified in the forest plan analysis; see comments to RNG-13.

An emergency action plan must be part of any EA developed for domestic sheep/goat allotment adjacent to source habitat/core home ranges. This emergency action plan must be incorporated into Annual Operating Instructions (AOI) for grazing allotments and trailing permits.

RNG-19: Guideline

To maintain separation, when bighorn sheep are found within 7 miles of an active domestic sheep and goat allotment, implementation of emergency actions for domestic sheep and goat grazing could include:

Reroute (move) domestic sheep or goats away from the risk.

Inform the appropriate state agency of the bighorn sheep location, domestic strays into bighorn habitat, or if a contact potentially occurred. Knowing of potential or known contact is essential for monitoring populations, continuing research efforts, and understanding possibly changes in population size.

Elk

WDFW is concerned about the lack of road density limits in the MA-4 category, particularly following forest restoration activities that will reduce the cover for elk at large scales. High road densities (>2 miles/square mile), will likely redistribute elk to secure habitat, if available at the scale necessary for elk. WDFW is particularly concerned about the summer and fall time periods when summer nutrition is critical and fall hunting pressure will be intense (page 55, Land Management Plan).

Dry forests that will receive restoration activities (Ponderosa pine habitats) will increase the available winter range for elk. Over the snow travel by A TV's and UTV's with tracks has been rapidly growing in popularity. While these areas may not have enough snow for snowmobiles, these new machines will use these areas extensively, causing disturbance to wintering elk. WDFW would like to see wintering elk populations protected from this growing recreation activity. WDFW recommends that the Final Plan adopt the portion of Alternative A that identifies big game winter range as a management area, and this layer is updated upon completion of restoration activities in consultation with State Fish and Wildlife Agencies. WDFW also recommends the final plan limit motorized recreation within big game winter range.

WLD-HAB-13 G-16: "Motor vehicle use within elk winter range should (Shall) not be authorized or allowed between December 1 and April 30" We recommend this Guideline be changed to a STANDARD.

Volume 2, Chapter 3, page 294: The plan states that elk populations are predominantly driven by management activities of the state wildlife agencies. While WDFW readily acknowledges that Fish and Wildlife Agency management activities influence population structure and trend, habitat is still the major contributor to a population's status. The main drivers of elk populations are cow survival and calf recruitment, both of which are driven by habitat. This is especially true considering that WDFW antlerless elk harvest is extremely limited on National Forest lands within Washington. The quality of summer habitat (Blue Mountains elk nutrition and habitat models) has been found to be a very important requirement for elk population reproductive success. The main two metrics in this model are cover and road proximity. The reduction of cover in large portions of the Forest will make road density that much more important in helping elk meet their nutritional needs. If security cover is reduced below a threshold, elk may move to low quality habitat or off the Forest, which would further require us to address depredation concerns by reducing the elk population.

The following are comments provided from the Oregon Department of Fish and Wildlife and they are provided verbatim because they so adequately address the issue of ungulate security cover.

Security cover for elk or mule deer is not defined under the Proposed Forest Plan and there is no established criteria/protocol to measure it across the landscape or on the individual project basis. WDFW recommends utilizing the cover standard from the 1990 Forest Plan, where "At least 30% of your forested areas should be in a cover condition at any point in time." "Optimum habitat for deer and elk requires hiding cover. Hiding cover is defined as vegetation capable of hiding 90% of a standing adult deer or elk from the view of a human at a distance equal to or less than 61 meters (200 ft.). Since deer are smaller, the height and density of vegetation suitable for cover may be less than that required by elk. In fact, hiding cover suitable for elk will probably be more than adequate to meet the needs of mule deer in the managed forests" (Wildlife Habitats in Managed Forests-the Blue Mountains of Oregon and Washington Page 109). Cover, whether it is security or hiding cover, needs to be well distributed across the landscape and available at the subwatershed and watershed levels. WDFW recommends adding the definition of hiding cover as a "Standard" in the revised Forest Plan.

To further address the above concern, WDFW recommends that the Forest Plan incorporate the Elk Nutrition and Habitat Model into the forest restoration activity planning and that the management proposals provide for adequate security and nutritional needs for the number of elk identified by Oregon (ODFW) and WDFW in their respective population objectives. Adopting appropriate road density standards within MA-4A lands will contribute significantly towards accomplishing this goal. This is particularly important when evaluating Figure 54 (Volume 2, Chapter 3, Page 303), which shows only 25% of the current hiding cover available for elk by Decade 5.

Blue Mountains Elk Initiative:

The Blue Mountains Elk Initiative (BMEI), with help from its numerous cooperators, is the longest running elk initiative in the United States. Despite this, it is not mentioned anywhere in the Forest Plan Revision. BMEI has been instrumental in protecting, enhancing and conserving thousands of acres of wildlife habitat over the last 26 years and the quality of work that has been instituted should be acknowledged in the Forest Plan Revision. Research, Elk Habitat/Nutrition Modeling, and the application of "Best Available Science" in individual project development and implementation, are just a few of the important BMEI products that have helped USFS and private land managers design and implement wildlife friendly projects. WDFW recommends continued USFS support for BMEI. Such partnership and collaborative efforts are essential to moving forward with elk and elk habitat management into the future.

Volume 2, Chapter 3, Page 327: Within the first paragraph of this section is a list of primary big game species hunted within the planning area. WDFW recommends that white-tailed deer be added to this list, as white-tailed deer comprise 42.4% of our general season deer harvest within Game Management Units overlapping USFS lands.

Volume 1, page 78: Regarding effects from Alternative E and F on areas suitable for motor vehicle route designation; Alternatives E and F allocate less acres to MA 3C wildlife

corridors compared to Alternative C. WDFW prefers Alternative C. However, if Alternative E or F is chosen then we recommend that wildlife corridors be added.

Focal Species/Management Indicator Species:

WDFW appreciates the efforts the USFS has taken to assess the viability of the various focal species selected. However, we are concerned that only 7 of 23 focal species on the Umatilla National Forest will see a decrease in viability concern. The viability concern for most species is predicted to maintain at a static level. In several cases, other management activities may offset the increase in source habitats. WDFW believes management activities of all sorts must complement the efforts to decrease viability concerns for the listed focal species.

WDFW would also like to see a standardization of Management Indicator Species (MIS) and analysis methodologies across all alternatives. This would enable the reviewer to more accurately compare the impacts to species from the various alternatives.

Throughout the alternatives listed, numerous indicator species have been selected to assess the effects that proposed management activities will have on suites of wildlife species. According to CFR 219.19(a)(6), "population trends of the management indicator species will be monitored and relationships to habitat determined." Within the document, we were unable to identify specific monitoring plans for the identified management indicator species. The Washington Department of Fish and Wildlife is willing to partner with the USFS in developing protocol and in monitoring species when possible and WDFW recommends that Standards be developed to direct monitoring of the management indicator species.

The Management Indicator Species (MIS) selected for the dry forest type is the white headed woodpecker which requires management of more open stands with larger trees and sparser understory. However, the USFS states that population trend data is not available for this species. If the white headed woodpecker is to be a MIS for the dry forest type we recommend that woodpecker population data be collected and used for monitoring instead of using acres treated to infer progress towards Desired Conditions.

Range/Grazing:

Volume 2, Chapter 3, Page 349, Pollinator Species: The last paragraph on this page describes the effect of grazing on bumblebee presence, "Forage utilization rates approaching 50 percent showed very little to zero bumblebee abundance" (Kimoto 2010). Although the populations of Spalding's catchfly are adequately addressed in this document on the Umatilla Forest, it is concerning that grazing utilization rates proposed within the plan would likely have such a negative effect on Bombus spp. without further evaluation. Pollinator species are critical to the healthy function of ecosystems and should be given further review to ensure long-term declines in plant species do not occur as a result of planned activities.

Page 71, Land Management Plan: The desired conditions for livestock grazing identify "maintaining or achieving ecological desired conditions". And while we believe as a whole

this standard is acceptable, WDFW would ask that the goal for sensitive areas like springs, headwater streams, and "prairie" systems be to improve the ecological condition.

Page 125, LMP, RNG-1, G-43: Change to STANDARD and modify. Grazing after wild land fire shall be deferred until vegetation recovers to a condition where grazing will not cause the percent composition of native species to be reduced (cause a downward trend in key species). This generally will be a minimum of 2 years, but could be longer depending on the extent and severity of the fire and other factors.

Page 125, LMP, RNG-3, G-45: WDFW recommends change to STANDARD and modify, that water developments "Shall" provide for small mammal and bird escape.

RNG-4, G-46: Change to STANDARD. In areas classified as less than fully capable or suitable, only limited grazing shall be authorized or allowed only after the limitations of the site are considered in designing the site-specific allotment management plan.

Page 125, LMP, RNG-5: WDFW applauds the USFS for attempting to ensure grazing practices improve ecological function (as a desired condition), over time. Utilization should be monitored and measured using an accepted science based monitoring protocol that compares the utilization to reference vegetation for accurate utilization rates. Ocular estimates should not be used in sensitive areas.

Volume 1, page 132: WDFW is concerned that the proposed utilization rates are high and could move the condition towards a higher departure from the Historic Range of Variability (HRV). For clarity, WDFW recommends that the use of the leader growth from that growing season is what is measured.

Volume 2, Suitability: WDFW notes that only 42% of the acreage within active grazing allotments are classified as suitable for livestock grazing and RNG-4, G-46 allows that some of these areas may experience limited grazing. We recommend that the guideline be clarified such that it would only allow grazing in suitable areas.

WDFW supports the use of standards for forage utilization. Currently, only Alternative C sets such standards. Therefore, WDFW supports Alternative C, unless these same standards were added to the preferred alternative.

Currently, the USFS utilizes end of season utilization surveys for monitoring. However, this method does not allow for adaptive management within the grazing season. WDFW recommends that utilization be evaluated at sensitive sites at intervals that will allow livestock to be moved within the allotment prior to overutilization occurring.

RIPARIAN MANAGEMENT AREA

Page 138, LMP, page 294 Appendix A; MA 4B, RMA-5, S-42: Pumps shall be screened to prevent entrainment of fish. We recommend that this standard include wording that the screen shall meet state and federal screening criteria.

Pages 141 LMP, 131 DEIS vol. l, 299 Appendix A; MA4B, RMA-RNG-2, G-115: Change to STANDARD. Vegetative utilization in riparian areas. The guideline states that herbaceous maximum utilization is 25% in bull trout spawning and rearing habitat and 35% in anadromous species habitat. There is an additional guideline that states that the minimum residual stubble height at the green line will be 4 to 6 inches. WDFW understands this is for roughness to filter sediment and nutrients, and that the utilization is measured by weight. However, grazing to 4 to 6 inches of stubble height could exceed utilization standards for some riparian species, and not meet these standards. To address this concern we offer the following potential revised standard)

(Herbaceous utilization at the greenline shall be subject to the same standard as the rest of the RMA. No vegetative species shall be utilized more than 25% in bull trout spawning and rearing habitat, or 35% in anadromous species habitat, maintaining a minimum residual stubble height of 6 inches on species where this is compatible with the utilization standard.)

Page 141, LMP, MA 4B, RMA RNG-4, G-117: Change to STANDARD. Livestock trailing and bedding in RMA. We recommend that loading should not be allowed in an RMA.

Alternative C, WDFW appreciates that the plan classifies riparian areas and sub watersheds with habitat for ESA listed fish species as generally unsuitable for "cattle" grazing, but feel this should be changed to "livestock" grazing.

Volume 1, Table S-1, page iv: Road densities should remain a standard.

FOREST/SILVICULTURE

Volume 1, page viii: WDFW understands that Desired Conditions could guide forest management, but would prefer that Old Forest Management Areas be managed with specific standards used to achieve Desired Conditions. Alternative C is preferable, but if Alternative E is chosen, WDFW would recommend adding the Old Forest Management Areas.

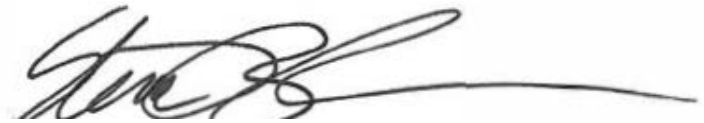
ROADS/TRAVEL MANAGEMENT

Under the Preferred, Alternative E, MA4A General Forest Designations would have open road densities of 2.4 miles of road per square mile. This is significantly higher than the preferred 1 mile of road per square mile that is the threshold above which elk displace to avoid disturbance. Therefore, WDFW would prefer Alternative C in this case, or would recommend changing the standard in Alternative E to reduce road densities in forage, cover areas, and winter range.

Lastly, The Forest Plan does not address a Travel Management Plan. WDFW strongly recommends at a minimum, that the plan include standards and guidelines that will be used to develop a future Travel Management Plan. A comprehensive Travel Management Plan is critical to maintaining ecological integrity on the forest and will be crucial for meeting desired future conditions.

We appreciate the opportunity to provide comments on this forest plan revision and more importantly the long-standing cooperative relationship between WDFW and the Umatilla National Forest which serves to benefit fish and wildlife in Southeast Washington. If you have any questions regarding these comments please feel free to contact me.

Sincerely,



Steve Pozzanghera, Regional Director
WDFW's Eastern Region (Region 1)

cc: Jeff Davis, Washington Department of Fish and Wildlife
Nate Pamplin, Washington Department of Fish and Wildlife
Kevin Martin, Supervisor, Umatilla National Forest

IN THE BOARD OF COUNTY COMMISSIONERS OF THE STATE OF OREGON FOR THE COUNTY OF BAKER

IN THE MATTER OF

REJECTING THE CURRENT DRAFT OF THE BLUE MOUNTAIN FOREST PLAN REVISION AND REQUESTING THE U.S. FOREST SERVICE BEGIN A NEW PROCESS ENGAGING THE AFFECTED COMMUNITIES

RESOLUTION NO. 2014-1031

WHEREAS, The U.S. Forest Service released a draft of the Blue Mountain Forest Plan revision document for public comment on March 14, 2014; and

WHEREAS, the Baker County Natural Resources Advisory Committee has reviewed and discussed the document, and finds the document to be flawed, inconsistent, and detrimental to the best interests of Baker County; and

WEHREAS, the Baker County Natural Resources Advisory Committee has therefore recommended that the Baker County Board of Commissioners reject the current draft of the Blue Mountain Forest Plan revision, and request that the U.S. Forest Service revert to the 1990 Wallowa-Whitman Forest Plan document without amendments, taking into account the best available science and engaging the communities and people most impacted by the Forest Plan revision in a meaningful way;

NOW THEREFORE, be it resolved that the Baker County Board of Commissioners:

1. Reject the current draft of the Blue Mountain Forest Plan revision and request that the U.S. Forest Service abandon the current planning effort.
2. Request the U.S. Forest Service revert to the current Wallowa-Whitman Forest Plan without amendments and take into account new peer reviewed science for Plan amendments.
3. Request that the U.S. Forest Service create a mechanism to ensure Baker County and communities, associated with the national forests included in this planning effort, are represented in the plan revision.
4. Request the U.S. Forest Service coordinate revision of the Wallowa-Whitman Forest Plan with Baker County.
5. Request the Wallowa-Whitman Forest Plan should be developed separately as a stand-alone document.

DONE and DATED this 6th day of August, 2014.

BAKER COUNTY BOARD OF COMMISSIONERS

Fred Warner Jr., Commission Chair

Tim L. Kerns, Commissioner

Mark E. Bennett, Commissioner

HAND DELIVERED

August 13, 2014

Forest Plan Revision Team
Blue Mountains National Forests
P.O. Box 907
Baker City, OR 97814
http://www.fs.usda.gov/goto/BlueMountainForestPlanRevisionComments

RE: Forest Service Notice of Proposed Rulemaking and Request for Comments Concerning Blue Mountains National Forests Proposed Revised Land Management Plan and Draft Environmental Impact Statement

Dear Sir/Madam:

The following comments are submitted to the U.S. Forest Service (USFS) on behalf of the Baker County Board of Commissioners ("the County") in response to USFS' published notice of proposed rulemaking and request for comment regarding the Blue Mountains National Forests proposed revised Land Management Plan (RLMP) and accompanying draft Environmental Impact Statement (DEIS) (collectively, "Plan"). See http://www.fs.usda.gov/detail/wallowa-whitman/landmanagement/planning/?cid=stelprd3792957. Of the three affected forests, Baker County's comments focus on proposed changes to the Wallowa-Whitman National Forest (WWNF) plan. WWNF comprises 33 percent of the County's area; thus its management and use is of great importance to our citizens. The County appreciates the opportunity to provide comments as a government body with special coordination privileges. Below, we have specified areas of the RLMP and DEIS that are not consistent with the Baker County Natural Resources Plan. We respectfully request a response that, consistent with the statute surrounding government-to-government coordination, USFS provide us with a response to each of our concerns, including proposed reconciliation between discrepancies (USFS regulations[8]; NFMA[9]; NEPA[10]).

Given the scope and number of concerns outlined in our submission, the County urges USFS to abandon this planning effort and instead revert to amending the existing plan, taking into account new science[11]. The draft RLMP is flawed for two fundamental reasons: 1) USFS failed to consult with the County Commission, and its Natural Resources Advisory Committee (NRAC), when developing the plan, which would have provided a means for avoiding many potential conflicts; and 2) the science purported to support many of the proposed actions does not reflect current scholarship. The plan revision effort should involve coordination with affected counties so that the civil society and communities associated with the national forests are represented in the plan

[8] "In the event of conflict with Agency planning objectives, consideration of alternatives for resolution within the context of achieving NFS goals or objectives for the unit would be explored." 36 CFR § 219 National Forest System Land Management Planning; Response to Comments; Final Rule and Record of Decision; 77 Federal Register 68 (April 9, 2012), p. 21197.

[9] NFMA: "[T]he Secretary of Agriculture shall develop, maintain, and, as appropriate, revise land and resource management plans for units of the National Forest System, coordinated with the land and resource management planning processes of State and local governments and other Federal agencies."

[10] NEPA requires that EISs "shall discuss any inconsistency of a proposed action with any approved state or local plan and laws (whether or not federally sanctioned). Where an inconsistency exists, the [EIS] should describe the extent to which the agency would reconcile its proposed action with the plan or law."

[11] The County notes that there is no scientific basis for retaining the standards found in the "Interim Management Direction Establishing Riparian, Ecosystem and Wildlife Standards for Timber Sales" ("Eastside Screens"). Eastside Screens should be abandoned in light of more up-to-date science and the fact that their implementation has had deleterious effects on our economy and social structure.

revision. Planning efforts should also establish a mechanism by which such involvement is ensured to continue. The County notes that the public-comment period that preceded development of the RLMP (in which "purposes and needs" were established) did not include adequate consideration of the local government's concerns. We would welcome the opportunity for the District Ranger and Forest Supervisor to meet with the County Commission and NRAC to lay out a process whereby the County may actively contribute to and engage in the revision process.

The overall planning effort is flawed not only in the range of alternatives, but in the pre-determined definitional changes and parameters that the RLMP proposes for every one of the alternatives. Although we have provided (in the Standards and Guidelines portion of our comments) amendments to "Alternative E," this does not imply agreement with the planning effort as a whole. It is only meant to point out some of the tremendous weaknesses of the proposed standards and guidelines. We reiterate that USFS should consult with the County and its NRAC to address the numerous and serious flaws we have identified.

Amongst our concerns with the planning effort is the proposal to address three forests with one plan. Each of these forests represents vast acreages whose variances will be difficult enough to address in individualized plans. The needs of citizens affected by each forest also vary, pointing to the necessity of three separate plans. Other problems with the planning effort include (but are not limited to) the Plan's impossibly small acreages determined to be "suitable" for productive and recreational uses; its proposed expansions of no-management or limited-management areas; its proposal to expand USFS' authority over water, beyond its legal jurisdiction; and its desired conditions and objectives, many of which exceed USFS' authority and conflict with Baker County's Natural Resources Plan (see Appendix A).

I. Contents:

   a. P. 3 – Overarching Concerns
   b. P. 16 – Standards and Guidelines Comments
   c. P. 45 – Wildlife Concerns
   d. P. 50 – Access Concerns
   e. P. 59 – Timber Concerns
   f. P. 67 – Mining Concerns
   g. P. 70 – Grazing Concerns
   h. P. 82 – Water/Watershed/Riparian Area Concerns
   i. P. 87 – Climate Change Concerns
   j. P. 89 – Special Land Designations Concerns
   k. P. 91 – Appendix A – Baker County Natural Resource Plan
   l. P. 92 - Wallowa County Plan – Grazing Utilization Standards for Late Spring/Summer

II. Introduction

   a. Baker County Board of Commissioners

The Baker County Board of Commissioners (Board) is charged with governing the County in the best interest of all citizens, its economic base and the natural environment. The citizens of the County rely on *both* public and private land for natural resources, recreation, and the ability to continue our way of life--especially agriculture and livestock grazing, mining, and timber harvest. The WWNF comprises approximately 33 percent of the County's landmass. Therefore, all decisions on the WWNF will affect Baker County's economy, customs, culture, and enjoyment of the land.

The Board recognizes the importance of private property rights, access rights of way, water rights, multiple uses for all public lands within Baker County, and the quality of the natural resources, and

that these uses are critical to the economic stability and wellbeing of our citizens. Our Baker County Natural Resources Plan commits to the below principles. These principles are consistent with federal law and, as such, should be followed by USFS in its development of the WWNF plan revision:

1. Revitalization and maintenance of multiple uses on all public lands in Baker County.
2. Multiple use shall be inclusive rather than exclusive, thereby avoiding pitting one use against the other.
3. All plans should mitigate based on multiple use rather than by a resource-by-resource issue.
4. Maintain flexibility in all plans to allow for extraction of natural resources from public lands and to continue to use existing resources in accordance with all laws.
5. Protect and preserve the following rights of all County's citizens, including:
    a. Private property interests, such as water rights and access to lands, which have ties to public lands,
    b. Traditional economic structures in the county that form the base for economic stability,
    c. Historical custom, culture and values of the local people, and
    d. Enjoyment of the natural resources of the County.

III. Overarching Concerns with the Plan

a. <u>Too closely reflects 2012 planning rule</u>
    i. While USFS states the Plan is based on the 1982 planning rule, it reflects many attributes of the flawed 2012 planning rule (demonstrated below). We do not believe the 2012 rule, which is currently in litigation, should serve as the basis of this Plan.

b. <u>The DEIS does not follow USFS' Multiple Use mandate.</u> The concept of "multiple use" management is a mandate imposed on USFS by Congress, codified in agency regulations, and affirmed by the courts. USFS must actively promote the stewardship role delegated to it by Congress in legislation spanning more than a century and consistently upheld by the courts. The Plan fails to adequately do so.
    i. Page iii of the RLMP states, "Public concern is heightened because the management to approach ecological resilience will determine the ecosystem services the Blue Mountains national forests provide." The public in Baker County really is concerned. Mismanagement and no management—in violation of USFS' multiple-use mandate—has left hundreds of thousands of acres in poor health and susceptible to insects and fire. The "management to approach ecological resilience" we see in the Blue Mountain Revision is in fact a blueprint for a future Forest with less access, more wilderness, more wildlife corridors and non-motorized areas, wider "riparian" buffers on ephemeral streams, and less timber management. Like the 2012 planning rule, the Plan places priority on things such as climate change, forest restoration and conservation, wildlife conservation, watershed protection, and other uses that ignore the needs of citizens of Baker County and the American people.
    ii. This is in violation of the multiple-use statutes: National Forest Management Act ("NFMA"), the Multiple Use Sustained Yield Act ("MUSYA"), the National Environmental Protection Act ("NEPA") and the Forest and Rangeland Renewable Resources Planning Act of 1974.
        1. The Plan must meet requirements under NFMA, 16 U.S.C. §§ 1600-1614, as well as allow the agency to meet its obligations under the MUSYA, 16 U.S.C. §§ 528-531. NFMA provides that

"[i]n developing, maintaining, and revising plans for units of the National Forest System . . . the Secretary shall assure that such plans—(1) provide for multiple use and sustained yield of the products and services obtained therefrom in accordance with the [MUSYA], and, in particular, include coordination of outdoor recreation, range, timber, watershed, wildlife and fish and wilderness. . . ." 16 U.S.C. § 1604(e). The MUSYA provides that "[i]t is the policy of the Congress that the national forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes." Id. § 528. MUSYA, in defining "Multiple use," states that "the various renewable surface resources of the national forests" are to be "utilized in the combination that will best meet the needs of the American people." NEPA, as recognized in the DEIS, is "An act to declare a national policy which will encourage productive and enjoyable harmony between humankind and the environment" and to "stimulate the health and welfare of humanity..."

iii. The Forest Service has failed to meet the goals set out in the Use Book of 1905, which states, "*The timber, water, pasture, mineral, and other resources of the forest reserves are for the use of the people; Forest reserves are for the purpose of preserving a perpetual supply of timber for home industries, preventing destruction of forest cover which regulates the flow of streams, and protecting local residents from unfair competition in the use of forest and range. They are patrolled and protected, at Government expense, for the benefit of the community and the home builder. We know that the welfare of every community is dependent upon a cheap and plentiful supply of timber; that a forest cover is the most efficient means of maintaining a regular stream flow for irrigation and other useful purposes; and that the permanence of the livestock industry depends upon conservative use of the range. The injury to all persons and industries which results from the destruction of forests by fire and careless use is a matter of history in older countries, and has long been the cause of anxiety and loss in the United States. The protection of forest resources still existing is a matter of urgent local and national importance."* This was true in 1905 and is still true today.

iv. Furthermore, as appropriately concluded by the U.S. Court of Appeals for the Seventh Circuit, USFS does not have the discretion to ignore the multiple-use mandate and focus solely on environmental or recreational resources. The court specifically held that "the national forests, unlike national parks, are not wholly dedicated to recreational and environmental values." Cronin v. United States Department of Agriculture, 919 F.2d 439, 444 (7th Cir. 1990).

v. The County REQUESTS that, in order to show a balance of multiple uses and truly recognize the "interdependency of social and economic components with national forest management," the "purpose and needs" on p. I of Vol. I include: "Protect the industries that depend on natural resources on the Forests;" and "Protect local communities, watersheds and multiple users from catastrophic wildfire."

vi. We do not believe that Alternative C should have been included, as it does not represent a multiple-use alternative. Its "protections" (severely reducing access, logging and grazing) are, in actuality, threats to the

ecosystem. Paradoxically, the DEIS heralds this alternative at the same time that it recognizes the threat it poses:

1. Vol. 2 p. 36 states, "Based on relative differences between protection scores among alternatives, alternative C provides the greatest degree of protection, lowest risk of management effects to species viability from roads, grazing and timber production, and likely provides the most opportunity for natural processes to restore riparian and aquatic habitats throughout the range of each species. This alternative also poses the greatest risk of impacts from wildfire by allowing unnatural fuel conditions to continue to build in dry forest landscapes, relative to other alternatives" (emphasis added).

c. Lack of Diversity in Alternatives May Violate NEPA
    i. As illustrated in our review of alternatives, below, the degree of diversity in the alternatives does not appear to meet NEPA's requirement for a diverse range of alternatives. This is exemplified in the following ways:
        1. The fact that a new, expansive definition of "riparian areas" is applied consistently to every alternative.
        2. The fact that "desired conditions" are consistent for every alternative.
        3. The fact that, in every alternative, timber management levels fail to bring forests to "desired conditions" within 50 years.
d. USFS should complete forest-specific plans.
    i. In our experience, agreement on land management is best obtained at the local level, which allows for variation in ecology, community perspective, and desired outcomes. While the Blue Mountains have much in common, there are many important differences. For example, we have found that moist mixed conifer restoration is likely to look very different on the Malheur National Forest than it is on the Wallowa-Whitman National Forest: the moisture gradients, harvest history, vegetation compositions, and collaborative engagement are dissimilar between the two forests, even though they are both part of the Blue Mountains ecosystem. Given these and other differences, attempting to craft three land management plans out of a single environmental impact statement is fraught with peril, and threatens to stall forest restoration across the entire region.
    ii. We strongly encourage USFS to reconsider revising all three forest plans at the same time with the same process. Instead, we ask USFS to consider a forest-by-forest approach that would allow each associated community to work directly with their local USFS personnel to develop a plan that best meets the needs of those communities.
e. DEIS socio-economic evaluations and expectations are downplayed.
    i. USFS' expectations for social and economic contributions of the WWNF are too low.
        1. USFS has standards and guidelines with specific measures for ecological aspects. There are no equivalent standards or guidelines to measure socio-economic vitality. WWNF only "contributes to" economic well-being but is not required to meet any standards.
        2. In the "Proposed Monitoring Question" table (p. 310 Vol 3), there are 36 questions dedicated to ecological status and only one dedicated to economics.

3. Under the "Vision" section with regard to "Social and Economic Expectations," p. 15 RLMP, USFS states: **"**Public land management inevitably involves conflicting public desires, values, and preferences. The public expects a diversity of uses from National Forest System lands. People frequently disagree about how the national forests should be managed. Interests and opinions are often held strongly, which can lead to a decision-making process characterized by conflict and controversy. This increases the complexity of national forest management." This is unacceptable for the "vision" of the social and economic expectations. The County asserts that language should be added that reestablishes that the laws governing the WWNF require that the forest be used for production to the benefit of the people.
4. In Volume 1 Introduction (p. 2), the document begins by stating the intent is to "provide" biodiversity, clean and cold water, and vegetation for habitat, and to "sustain" ecological processes. However, instead of "providing for" or "sustaining" the social and economic wellbeing of the local communities (via access and productive uses such as mining, grazing and logging), the document states the Plan will merely "contribute to" the aforementioned.
5. RLMP p. 70-73. All productive uses (Forest Products, Grazing, Special Uses, Mineral and Geological Resources, Water Use) have stipulations in their economic "Desired Conditions" that ecological "desired conditions" also be met. However, in the "Promote Ecological Integrity" section, none of the "desired conditions" for wetland function, special habitats, etc. contain language stating that socio-economic wellbeing of the dependent communities must also be met. Such language should be included in all desired conditions.

ii. USFS underestimates its ability to contribute to socio-economic health and instead focuses on ecology only.
1. The Vision portion of the RLMP (p. 66) also states "Many of the factors that contribute to community resiliency are beyond the control of…the Forest Service. This limits the ability to improve community resiliency through the management of the national forests." USFS denies it has the ability and responsibility to <u>provide for</u> socio-economic viability in our communities.
2. Even in the "Promote Social Well-Being" portion of the Vision (Part I), the document focuses on scenery, wildlife, "restoration efforts," old forests, avoiding sedimentation, and minimizing roads. It does not recognize that our logging, mining and ranching families are the fiber of the society USFS refers to in the term "social well-being." Our economic viability and customs (also not mentioned in the "Cultural Resources" section, p. 59) are inseparable from "social well-being."
3. The RLMP section titled "Promote Economic Well-Being" (p. 66) leads with "Facilities and Infrastructure," then "Land Ownership" (acquisition of land by USFS). The administrative facilities of USFS should not lead the "Economic Well-Being" section. Land acquisition by USFS is an inappropriate second category in a

section that should be focusing on the true economic drivers on the WWNF: logging, mining, grazing, and access.

iii. Underestimates socio-economic impacts of proposed new regulations on access, timber, mining, grazing (see more in comments on individual resource areas.)

1. Vol I Page 126 states "There would be no adverse effects to human health and no alternative has been determined to disproportionately affect minority or low income populations". We disagree. Our rural citizens are largely low income (18 percent being below the poverty line, per Vol 1 p. 111), and it is largely a result of inability to access WWNF resources. For example, Baker County's economy has been devastated by lack of timber harvest. Most of our sawmills are gone. Forest Service actions have definitely adversely affected our county. The RLMP proposes to worsen these effects.

f. <u>"Unconstrained budget" alternative should have been considered.</u>

i. USFS should have included as an alternative the Unconstrained Budget Alternative (Alt. K). A full analysis of Alternative K would be beneficial because it would provide a baseline from which to evaluate all other alternatives. Fully developing Alternative K would provide the most accurate information concerning the costs of undertaking a particular action versus the benefits received from the action.

ii. USFS has constrained its alternatives based on potential budgets, but this is not required under the 1982 rule. Currently, USFS is in litigation concerning this issue. USFS should not include budget constraints in its alternative analyses.

iii. The DEIS states "It is not realistic or reasonable to ignore expected funding levels… The forest plan does not influence or control the budgets for the national forests…" (Vol I p. 15). The latter part is true--and budgets *may* increase. Also, while USFS may not have influence over congressionally appropriated budgets, it does have influence over activities such as logging on the WWNF, which could easily provide the funding needed for road maintenance, etc. while achieving healthy forest conditions.

g. <u>The Plan should not require use of "best available scientific information."</u>

i. Neither NFMA nor NEPA require use of the "best available science." The Ninth Circuit Court of Appeals (Lands Council v. McNair) affirmed that these statutes do not require it. Additionally, case law has established that the agency can make natural resource management decisions based on its discretion in weighing various multiple use objectives. See Seattle Audubon Society v. Moseley, 830 F.3d 1401, 1404 (9th Cir. 1996).

ii. Although the agency acknowledges (p. 4, RLMP) that "What constitutes best available science might vary over time and across scientific disciplines," the term "best available science" opens the agency up to endless litigation.

iii. The RLMP says "the NEPA document should identify methods used, reference scientific sources relied on, discuss responsible opposing views, and disclose incomplete or unavailable information, scientific uncertainty, and risk…" There will be no way for the agency to defend itself when a special interest group claims that USFS did not "discuss responsible opposing views." What qualifies as a "responsible opposing view"? That

will undoubtedly be a point for legal challenge. Also, "unavailable information" may well be "available" according to these groups, and they can sue accordingly.

iv. Finally, sound national forest planning and management that complies with NFMA, the MUSYA, and other applicable laws must reflect more than "western" or European culture academic science and scientist opinion. Native American and other traditional local knowledge, along with other practical expertise, coordination, collaborative consensus reached through the planning process regarding application of science, and other considerations are critical to environmentally, economically, and socially sound forest planning and plan implementation.

h. Document lacks Science-backed Data

i. The preferred alternative proposes stricter regulations on timber, grazing, mining, and access with no sound scientific basis. In many cases, the restrictions will in fact have a negative effect—not only on the County's economy, customs and culture, but on the environment. The studies cited are biased against human uses of the resources.

ii. Council on Environmental Quality (CEQ) regulations require that, when preparing an EIS, the agency shall "identify any methodologies used and shall make explicit reference by footnote to the scientific and other sources relied upon for conclusions in the statement." 40 C.F.R. § 1502.24. Many of the guidelines detailed in the DEIS lack this required scientific justification. Therefore, the DEIS does not satisfy the requirements of NEPA.

1. For example, guideline G-115, which establishes maximum utilization standards for livestock grazing within riparian management areas, contains no reference to scientific literature or other sources of authority that might explain how the USFS established the utilization percentages provided in Table A-55. DEIS Vol. 3 at 299. Indeed, the USFS acknowledges that all utilization standards established in the Proposed Plan and DEIS are based on an *assumption* that 40 percent utilization is necessary to achieve the desired conditions for the plan's ecological goals. DEIS Vol. 1 at 129.

iii. Much of the "science" used to justify current and desired conditions is based on the Interior Columbia Basin Ecosystem Management Project (ICBEMP), which does not represent the most current or relevant information about the condition of the Blue Mountains forests; violates the multiple-use mandate of USFS; and has been improperly implemented without due process under NEPA.

1. The body of science used for ICBEMP was published in 1996 and in many cases was based on research that is significantly older. While some of these conclusions may still be valid, there is little discussion or application of more contemporary research that has taken place in our ecosystem since 1996, and little explanation why ICBEMP does or does not still represent the forefront of knowledge about the Blue Mountains. Since 1996, many researchers have begun to work extensively across the Blue Mountains, gathering and publishing information about old growth forests, wildlife needs, aquatic systems, landscape process, and the socioeconomic dynamic. We encourage you to work with Baker

County and other local governments to obtain this science and implement it in the plan revision.

2. In a U.S. congressional hearing held on March 10, 1998, representatives stated that ICBEMP was not authorized by Congress. That year, a federal appropriations bill required that any further implementation of ICBEMP be preceded by in-depth reporting to Congress of the expected cost and effects of its implementation, with targeted focus on local socio-economic effects. Ultimately, a final record of decision was never issued on the ICBEMP. Its implementation, or use of its contents, remains premature and inappropriate.

iv. The majority of forest management studies are decades old and have newer, more relevant alternatives. See "Science is Outdated" Section of Timber Concerns.

v. The science used in the range portion is unbalanced.

1. Decisions surrounding bighorn and domestic sheep are being made on the basis of inadequate science, as stated by both Congress and a federal judge.
2. The science surrounding effects of livestock grazing, generally, is one-sided.

vi. USFS should not base decisions on climate change. This area of science is far too uncertain to be making damaging decisions such as: Management strategies including "reducing potential increases in stream temperatures through riparian buffers. Reducing the risk of water quality degradation by (1) Decreasing road density (2) closing, realigning or obliterating roads. ... "reducing barriers to species movement (close roads, destroy fences)…" These proposed actions have the potential to devastate our communities, while the matter of "climate change" is uncertain and completely out of USFS' hands.

i. <u>USFS did not adequately consider County's input.</u>

i. Baker County appreciates the importance of coordinated management of National Forests across the Blue Mountains but notes that the social and ecological conditions under which management will be addressed are not homogeneous. As management will take place at a much finer scale, (e.g., a watershed or a cluster of adjacent watersheds), Baker County notes that it is imperative that the plan provide sufficient flexibility that local social and ecological conditions will be considered in laying out alternative approaches. Coordination with the County is crucial to this effort.

ii. Public lands dominate the landscape in Baker County, with approximately 52% of the land in the County managed by a public agency. Therefore, decisions made by the agencies managing our public lands directly affect Baker County's residents, custom and culture, economy, and valued way of life. Baker County citizens and elected officials have an in-depth knowledge and vested interest in the land, the economy, and the customs and culture of the County. In recognition of this, many federal and state acts or mandates require agencies to coordinate their proposals to be consistent with local plans, including our Natural Resource Plan, and policies.

iii. Baker County opposes any USFS action without the County having waived the opportunity to coordinate.

iv. Vol 3 Page 13 describes county commissioners as "Co-conveners" who helped develop this plan. However, the preferred alternative does not reflect the County's input.
v. P. 2 of the RLMP should include local governments as well as tribes in the following: "The revised forest plans will continue to honor American Indian reserved rights through consultation and coordination, and will maintain a government-to-government relationship with federal recognized tribal governments."

j. "Alternative A- No Action" is not well defined.
   i. This basic flaw in the planning document is demonstrated in the Standards and Guidelines portion (Vol 3 p. 256). The S&G designators in the left-hand column (example: WLD-HAB-1 G-1) imply that there is a corresponding standard or guideline that exists in the current plan, unless a proposed Standard/Guide is labeled "New." However, there are no such corresponding standards or guides that currently exist. The County has been informed by USFS that these designators simply refer to USFS' interpretation of a conglomeration of existing standards/guides found in the 1990 plan, amendments, and PACFISH/INFISH. Thus, if a commentor were to request "Alternative A – no action" as his preferred alternative, it is essentially left to USFS to define what the commentor meant (unless the commentor specified an existing S/G in the current plan, PACFISH/INFISH or an amendment). This fact was not explained in the document, and will obfuscate the comment process. Such leeway given to the USFS in interpreting comments is unacceptable.

k. Some of the "Desired conditions" are not consistent with the County plan
   i. For any of the "desired conditions," we are concerned that USFS may attempt to achieve them in a manner inconsistent with our plan. To resolve this, each of the desired conditions should include a requirement for coordination with the County. Page 5 of the RLMP states, "Desired conditions …attempt to paint a picture of what we (the public and Forest Service) desire the forests to look like and/or the goods and services we desire them to provide." The affected counties should have elevated status above the "public" when determining desired conditions.
      1. REQUEST that each of the desired conditions state "Coordination with the affected county or counties will be done to ensure progress is made toward desired conditions in a fashion that is consistent with county land use plans."
   ii. We do agree, as stated on p. viii of RLMP ("Comparing Alternatives") that the "Desired conditions are broad and may only be achievable over long periods of time."

l. Maps provided in the DEIS are inadequate in size/detail.
   i. The maps provided were so small in scale that there was no way to use them, even in areas where residents know the ground. This makes substantive public and county input difficult. We believe this is done intentionally, since we have made this very complaint with many USFS documents in the past.
   ii. The "new and improved" interactive maps would not load on many computers. Where they would load, the layers took up to 15 minutes.
   iii. No consideration was given to citizens who do not have computers.

iv. Good quality maps, showing topographical lines, township range and section, and drainages would have solved the map problem. Forest maps should have been considered.

m. Wilderness and Other Special Designation Concerns:
   i. New special designations are not appropriate within Baker County. They lead to concerns with public safety, economic productivity, and recreational enjoyment.

n. Many proposed "Guidelines" more closely resemble "standards."
   i. Many guidelines in Alternative E were so prescriptive that they no deviation from those "guidelines" could be done without violating the spirit of the guideline. Such "guidelines" are better labeled "standard."
   ii. USFS seems to differentiate between the words "should" and "shall." Many of Alt C's "shall" provisions are simply converted to "should" and listed as a "guideline." We question whether these two words would be treated differently in court.

o. Wildfire not adequately addressed:
   i. The socio-economic impacts of wildfire that will result from any of the alternatives are underestimated/not fully explored in the DEIS. None of the alternatives would bring substantive relief to the catastrophic wildfires Baker County is experiencing.
   ii. Proposed reductions in fuel-reducing activities such as logging and grazing will worsen catastrophic fire threat.
   iii. USFS demonstrates its lack of appropriate emphasis on wildfire in Volume 1 "Introduction," which begins by stating USFS' intent is to "(1) protect plants and animals (2) address management of fire (3) protect watersheds (4) address climate change and (5) recognize the interdependency of social and economic components." While plants, animals and watersheds will be "protected," USFS states fire management, a huge problem on the WWNF, will only be "addressed". This places it on the same level as discussions on climate change, which will also be "addressed"--even though climate change is beyond the control of USFS. Reducing the threat of wildfire, on the other hand, is very much within the agency's capability--and responsibility.
   iv. The "Minimum Impact Suppression Tactics" (MIST) approach is overly restrictive and does not allow all available tools to be used to stop devastating wildfires. We believe that, by proposing to implement MIST in special designation areas as well as riparian areas, USFS puts at risk Baker County citizens' health, safety and wellbeing.

p. Wildlife populations should not be a focus.
   i. USFS exceeds its authority and violates Multiple Use statutes by focusing on wildlife populations (see "Wildlife" section for more details). USFS defines "species of concern" too broadly.
   ii. In addition, USFS attempts to give itself authority to curtail all other uses when "species of concern" are present. This is exemplified by the proposed creation of "wildlife corridors," which we oppose. Even if we were to accept the premise that species protection takes priority over all other multiple uses, USFS' "hands-off" approach will be ineffective in "protecting" species. It will, in fact, have results such as catastrophic wildfire, vegetation overgrowth, and loss of private ranchlands important to wildlife.

q. USFS attempts to exceed its authority and violate Multiple Use statutes in its proposals to regulate water and water uses within the planning area.
    i. USFS exceeds its authority:
        1. The State of Oregon is responsible for regulating and allocating water use. USFS' calling for "Connectivity" between watersheds, for example, is outside the agency's authority. So is USFS' focus (p. 24 of RLMP) on "Instream flows, including water yield, timing, frequency, magnitude, and duration of runoff…"
        2. P. 73 of RLMP states: "Desired condition: Water is available in sufficient quantity downstream to meet human needs as well as the needs of aquatic species considering the range of possible climate change scenarios." This should include "recognizing the State's primacy over the regulation of these waters, as well as existing water rights."
    ii. In addition, USFS proposes to take water use away from human use for the "benefit" of wildlife's only. This is not only a false choice (precluding human use of water does not protect wildlife), but is also in violation of USFS' Multiple Use mandate.
        1. Example: "Key watersheds" cover large area and focus only on wildlife use. Natural ecosystems, including "key watersheds," must also provide benefits to humans.
        2. Removing "human intervention" should not be a goal, as stated in "All Watersheds - Desired Condition" (p. 23 of RLMP): "The watershed-scale processes that control the routing of water, sediment, wood, and organic material operate at levels that result in self-sustaining riparian and aquatic ecosystems that do not require human intervention or restoration." Increasing productive uses (timber harvesting, mining, grazing), should be included as part of the desired condition.

r. USFS "Ecological Integrity" Goal Is Not in Keeping with Baker County Plan
    i. USFS' first goal in the plan (see p. ix, Vol 1) – "to promote ecological integrity" – may not be consistent with the County's goals. From a lay perspective, the goal as presented is a series of disconnected sentences that use terms and jargon that are nonsensical while at the same time having an authoritative tone. For example, the goal states: "*Ecological integrity is a condition that sustains the wholeness or completeness of ecosystem structure, composition, and function*." And, the definition provided in the Glossary (Volume 3, page 17) states: "*In general, ecological integrity refers to the degree to which all ecological components and their interactions are represented and functioning; the quality of being complete; a sense of wholeness."* Such language opens the door for legal challenges by "environmental" groups.
    ii. A quick search of definitions of "ecological integrity" provided several that would be more appropriate:
        1. For example, the Washington State Department of Natural Resources defines ecological integrity as: "The structure, composition, and function of an ecosystem operating within the bounds of natural or historic range of variation."
        2. Parks Canada, on their website, defines ecological integrity as: "…a condition that is determined to be characteristic of its natural region and likely to persist, including abiotic components and the

composition and abundance of native species and biological communities, rates of change and supporting processes."

3. And finally, from the Simon Fraser University website (probably the most appropriate given the interest in achieving a resilient forest): "… the abundance and diversity of organisms at all levels, and the ecological patterns, processes, and structural attributes responsible for that biological diversity and for ecosystem resilience." (Coast Information Team, 2004).

iii. Other terms used in the same paragraph - ecological function, ecological structure – are just as ambiguous. The definition of "ecological function" in the glossary refers you to "Ecological Processes", which is defined as: "*The flow and cycling of energy, materials, and organisms in an ecosystem*." How does "watershed function, species diversity, productive capacity, disturbance processes, and invasive species", which are cited as descriptors of the National Forests' contribution to ecological function, relate to the ecological processes as defined in the glossary? "Ecological structure" is not defined in the glossary.

s. Indicators of Sustainability Are Misidentified

i. In the explanation following Goal 1, it is stated: "*Landscape patterns, special habitats, and snags and down wood are also indicators of sustainability in the Blue Mountains*". These may be valid descriptors of different elements of ecosystems, but they would never qualify as "indicators of sustainability". Further, the definition of "sustainability" provided in the Glossary does not relate at all to these metrics.

t. USFS Goals Are Inconsistent

i. The Goals that are listed in the Summary are not repeated in the body of the Plan. However, in the "Purpose and Need" section, different goals are cited, which are stipulated in legislation. These two statements of goals should be reconciled **or** the plan should limit its focus to one set of goals.

u. "Ecosystem Services" Portion Could Be Improved

i. Another term used in the proposed Revision to the Forest Plan is "ecosystem services." It is defined in the Glossary (Volume 3, page 18) as "The combined resources and processes of natural ecosystems that provide benefit to humans, including, but not limited to, the production of food and water, the control of climate and disease, cycling of nutrients and crop pollination, spiritual and recreational benefits, and the preservation or maintenance of biodiversity."

ii. A better, more comprehensive list of the services provided by ecosystems is provided in the Millennium Ecosystem Assessment (2005 and 2012). This could be included in a table in the proposed Revisions to the Plan to convey the diversity of these services and clearly link them to the various benefits local residents realize from the Forests.

Baker County Suggestions on Standards and Guidelines (Vol 3 p. 256)

Note: As stated on p. 1 of these comments, Baker County requests that USFS abandon this planning effort and instead revert to amending the existing plan, taking into account new science. In light of our opposition to the current planning effort, we have provided below our comments on the proposed (Alt E) standards and guidelines. We have offered modifications to Alt E to demonstrate some of the changes we would require in this section. We reiterate, however, that even if our suggested standards and guidelines were adopted we would not support this flawed planning effort.

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 257 WLD-HAB-6	**Standard** Activities that have potential to cause abandonment or destruction of known denning, nesting, or roosting sites of threatened, endangered, or sensitive species shall not be authorized or allowed within 1,200 feet of those sites.	No corresponding alternative	There is no scientific basis for this standard. USFS proposes to deviate from its multiple use mandate by banning any activity with "potential" to cause nest abandonment or destruction for threatened, endangered, or even "sensitive" species. "Sensitive species" are identified at the discretion of the regional forester with a very low bar for qualification, including "predicted" downward trends in population or habitat capability (see more detailed comments on "Sensitive species" in the Wildlife Concerns section of our comments).
p. 259 WLD-HAB-12 S-7	**Standard** Where mechanical treatment activities occur within dry or cool moist forest habitat, all snags 21 inches d.b.h. and greater and 50 percent of the snags from 12 to 21 inches d.b.h. shall be retained, except for the removal of danger/hazard trees. Snags shall be retained in patches.	Alt E modified: convert to **Guideline**	Setting these conditions as a "STANDARD" is too prescriptive. Does not allow latitude to consider alternative management options that may be more appropriate in certain conditions. REQUEST the conditions cited in Alternative B be framed as GUIDELINES.
p. 294 MA 4B RMA-4 G-103	**Guideline** Water drafting sites should be located and managed to minimize adverse effects on stream channel stability, sedimentation, and in-stream flows needed to maintain riparian resources, channel conditions, and fish habitat.	Alt E modified: **Guideline** "Water drafting sites should be located and managed to minimize adverse effects on stream channel stability, sedimentation, and in-stream flows needed to maintain riparian resources, channel conditions, and fish habitat, <u>so long as such management does not interfere with existing water rights.</u>	USFS must bear in mind that it does not hold federally reserved rights of water use for purposes of maintaining riparian resources, channel conditions, or fish habitat. These are secondary purposes of the agency for which it must apply for water rights. (USFS does hold federally reserved rights to carry out two primary functions: to furnish a continuous supply of timber for the people, and to conserve water flows.)

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 294 MA 4B RMA-FIRE-1 G-104	**Guideline** Disturbed areas, such as firelines, drop-points, camps, roads, and trials, should be restored by actions such as scattering slash piles, replacing logs and boulders, scarifying soils, recontouring terrain, and reseeding with native species.	Alt E modified: **Guideline** Disturbed areas, such as firelines, drop-points, and <u>camps established for firefighting purposes</u> should be restored by actions such as scattering slash piles, replacing logs and boulders, scarifying soils, recontouring terrain, and reseeding with native <u>or desired non-native</u> species.	Camps, roads and trails should not necessarily be "restored" (destroyed), especially if they preexisted firefighting efforts. Roads and trails Desired non-native species may at times be the best choice for reseeding in order to stabilize the area and prevent noxious weed/annual grass invasion.
p. 259 WLD-HAB-13 G-16	**Guideline** Motor vehicle use within elk winter range should not be authorized or allowed between December 1 and April 30	No corresponding guideline	How is "elk winter range" defined? Elk wander into high-use areas, and this could affect roads in the Valley. Elk are approaching twice their management objectives in several units within the planning area and should not be considered a focus species. Additionally, the new research report "Habitat-nutrition Relations of Elk During Spring through Autumn in the Blue Mountains of Eastern Oregon" by Rachel C. Cook, John G. Cook, Robert Riggs, Larry L. Irwin (2014) identifies summer nutrition as the most critical habitat need, not road issues.

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 260 WLD-HAB-14 New	**Guideline** In greater sage-grouse habitat, developing new roads, motor vehicle trails, and artificial water impoundments should be avoided. During the breeding season, seasonal closure of open motor vehicle routes within 2 miles of known leks (protected activity centers) should be considered.	Alt E modified: **Guideline** In greater sage-grouse habitat, developing new roads, motor vehicle trails, and artificial water impoundments should be avoided, unless necessary to utilize existing rights. During the breeding season, seasonal closure of open motor vehicle routes within ~~2 miles of~~ known leks (protected activity centers) should be considered, except for permitted grazing and mining purposes or fuel-reduction activities. Road closures will require approval of affected counties.	The guidelines for WLD-HAB-14-17 cite different distances (2 miles and 3 miles) from leks that different activities can be undertaken. Appears arbitrary without an authority cited. In the absence of credible science Baker County proposes either abandoning these 4 conditions, or adopting Alt E modified. WLD-HAB-15-17 should clarify that these limitations have no bearing on lands adjacent private or state lands.
p. 260 WLD-HAB-15 New	**Guideline** Surface occupancy for mineral or fossil fuel exploration or extraction should not be authorized or allowed within 3 miles of occupied greater sage-grouse leks (protected activity centers).	Alt E modified: **Guideline** Surface occupancy for mineral or fossil fuel exploration or extraction should be authorized in coordination with affected counties with a goal of avoiding greater sage-grouse leks (protected activity centers) where possible.	
p. 260 WLD-HAB-16 New	**Guideline** Power lines, communication towers, meteorological towers, and other tall structures should not be constructed within 2 miles of greater sage-grouse leks (protected activity centers).	Alt E modified: **Guideline** Power lines, communication towers, meteorological towers, and other tall structures should be constructed, after coordinating with affected counties, with a goal of avoiding greater sage-grouse leks (protected activity centers) where possible.	

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 260 WLD-HAB-17 New	**Guideline** Construction of wind turbines should not be authorized or allowed within 2 miles of greater sage-grouse leks (protected activity centers).	Alt E modified: **Guideline** Wind turbines should be authorized, after coordinating with affected counties, with a goal of avoiding greater sage-grouse leks (protected activity centers) where possible.	
p. 260 WLD-HAB-18 G-7	**Guideline** Bat maternity and roost sites should not be disturbed.	Alt E modified: Bat maternity and roost sites should not be disturbed when practical.	
p. 261 WLD-HAB-19 G-4	**Guideline** Greater than 50 percent of post-fire source habitat should be retained and should not be salvage logged, except in the wildland urban interface.	Alt E modified: **Guideline** Coordination with affected counties shall determine where salvage logging occurs.	What is the scientific basis for this guideline? There is need to assess ecological benefits against the lost income from salvage logging. Reduction in the percentage of post-fire areas being retained to 25% to 30% would not make an appreciable difference.
p. 261 WLD-HAB-20 G-4	**Standard** Salvage logging shall not occur within burned source habitat areas less than 100 acres, except for the removal of danger/hazard trees.	Alt E modified: **Guideline** Site-specific information and coordination with affected counties shall determine where salvage logging occurs.	The STANDARD is too restrictive. There is no legitimate rationale for imposing this restriction at the scale of 100 acres. Salvage logging could be an ecological and economic benefit if managed carefully.
p. 261 WLD-HAB-21 G-6	**Guideline** Where salvage logging occurs, all snags 21 inches d.b.h. and greater and 50 percent of the snags from 12 to 21 inches d.b.h. should be retained except for the removal of danger/hazard trees. Snags should be retained in patches.	Alt E modified: **Guideline** Coordination with affected counties shall determine where salvage logging occurs and to what degree snags are retained.	Setting arbitrary (from an ecological perspective) size limits to salvage logging constrains management options that could have positive benefits ecologically as well as economically. To avoid major insect build-up on fire stressed trees and the resulting increase in mortality in green timber stands, aggressive salvage is needed. Modify WLD-HAB 19-21 guidelines to allow 100% salvage logging after all fires.

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 261 WLD-HAB-22 New	**Guideline** Following wildfires greater than 10 acres in greater sage-grouse habitat at high risk of annual grass invasions, seeding with an appropriate mixture should be accomplished to reduce the probability of cheatgrass establishment.	Alt E modified: **Guideline** Following wildfires greater than 10 acres in greater sage-grouse habitat at high risk of annual grass invasions, seeding with an appropriate mixture, <u>which may include desirable non-native plants</u>, should be accomplished to reduce the probability of cheatgrass. <u>Livestock grazing should be used as a tool to establish desired plant communities</u>.	We agree with this guideline, and add that non-native grasses sometimes have the best chance of establishing themselves in lieu of cheatgrass. Also, grazing is an effective tool in restoring burned areas. Evidence of such successes is seen in some of the literature. A fire science brief from 2011 indicated that a study of successful seeding treatments found that 83 percent had used non-native species (i.e., grasses and cereal grains) (Evaluating the Effects and Effectiveness of Postfire Seeding Treatments in Western Forests Joint fire science programs. Fire Science brief. Fire Science Brief Issue 147 December 2011 Page 1 www.firescience.gov) There is ample evidence that non-native seeds are and can be successful in reducing the invasion of noxious weeds, in particular the invasive annuals such as medusa head, venenata and cheatgrass. We need to be aggressively moving to block those annuals from spreading. Native seedings are much more expensive with much lower success rates.
p. 262 WLD-HAB-25 G-12	**Guideline** Where management activities occur within riparian habitat, the quantity, stature, and health of shrubs should not be reduced or degraded.	No corresponding guideline	Existing standards and guides address this issue. According to USFS, riparian areas are in an upward trend in the planning area.
p. 262 WLD-HAB-26 G-14	**Guideline** Roads and trails should not be constructed within high elevation riparian areas.	No corresponding guideline	Baker County believes enough of our national forests have been placed off-limits to access. We see little difference between the preferred alternative ("should not") and Alt. C ("shall not"). Alt. C is not a multiple-use alternative and should not be used as a model for the preferred alternative. This is a safety issue as well. Prohibiting road and trail construction in "high elevation riparian areas" (which is not well-defined) is not supported by science and may diminish our ability to reduce fuel loads and fight fire.
p. 263 WLD-HAB-28 G-13	**Guideline** Vigor and areal extent of seed producing grasses and forbs should not be reduced.	No corresponding guideline	This is too subjective (seed producing grasses and forbs should not be reduced). This could be a desired condition but not a hard and fast guideline.

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 263 PL-TES-1 New	**Standard** Livestock grazing shall not be authorized or allowed during the Silene spaldingii active growth period (generally between May 15 and August 30) in pastures that exhibit low departure from the desired condition, unless the grazing management history demonstrates that livestock avoid Silene spaldingii occupied habitat.	No corresponding standard	This is duplicative given the guideline that calls for avoiding ESA plants if possible. This guideline is inappropriate for a plant that grows and thrives following disturbance. Further, "low departure" is not defined. Removing livestock based on this subjective measure is unacceptable. There is no proof backed by research that demonstrates removing grazing during the growing season for Spalding's catchfly will increase the population of the plant, therefore these standards should not be considered a conservation measure. Entire pastures should not be off-limits to grazing; this could mean thousands of acres unnecessarily closed to grazing. The issue should be addressed at the **project level** through formal consultation (ESA Section 7). USFS should not presume grazing "guilty until proven innocent." Additionally, placing timing restrictions (May 15-Aug 30) severely limits the flexibility to responsibly manage the range resource as whole. This time period constitutes 5 out of the 7 months that are the grazing season on most general forest management areas. This is also in direct conflict with pastures that have riparian areas that need special consideration and should be grazed earlier in the season before the weather is hot. It also creates scenario where grazing will be prohibited altogether when Spalding's catchfly is paired with ESA threatened/endangered fish spawning limitations (steelhead no cattle entry prior to 7/15, and chinook/bull trout no entry after 8/15). The single-purpose management approach proposed by this standard is outside USFS' authority and is not supported by range science. Amongst USFS' multiple-use mandate is to provide an environment that encourages species diversity. Livestock grazing contributes to that environment.

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 264 PL-TES-2 New	**Standard** Livestock grazing shall not be authorized or allowed in pastures occupied by Silene Spaldingii that exhibit moderate or greater departure from desired condition.	No corresponding standard	This standard is unnecessary –see above comment. Departure from desired condition may not be a result of grazing, and it should not be made the automatic scapegoat. Grazing can and should be managed to contribute to, not detract from, desired conditions.
p. 264 PL-TES-3 New	**Guideline** Domestic livestock grazing should not be authorized or allowed in the fens/bogs sensitive plant habitat groups.	No corresponding standard/guide	This "guideline" is far too restrictive and has the qualities of a standard. There is no way to allow departure from this "guideline" while still meeting its "intent."
p. 264 PL-TES-4 New	**Guideline** Maximum forage utilization of key species should not exceed 30 percent in occupied habitat of threatened, endangered, and sensitive plant species, except where an approved conservation strategy, conservation agreement, or recovery plan approves an alternate use level.	No corresponding standard/guide	This is, again, a standard in the name of a guideline. The broad-stroke assumption that 30 percent utilization will benefit these species is non-scientific. See comments on utilization in our "Grazing Concerns" section. Because "sensitive species" is such an overly broad category, this "guideline" has the potential to place the 30% standard on huge areas, thereby greatly harming the grazing industry in the County. (See "Wildlife Concerns" section of our comments for why "species of concern" category should be eliminated.) Requiring an "approved" conservation strategy, agreement or recovery plan for "sensitive species" places a huge burden on the agency and threatens its ability to continue its multiple-use mandate. Litigation could stall plans/agreements for years. If this guideline is included, grazing must be allowed to continue during development of such agreements/plans.
p. 264 PL-TES-5 New	**Guideline** New water developments and salting should not be authorized or allowed within one-quarter mile of occupied habitat of threatened, endangered, or sensitive plant species.	No corresponding standard/guide	To disallow new water developments impinges on water rights and the authority of the State of Oregon to allocate water resources. Placement of salt and water development is an important management tool that should not be restricted. There is no scientific justification for a quarter-mile buffer around species, particularly "sensitive" species that can be designated at-will by a regional forester. Other standards and guidelines are in place to protect ESA species; thus this guideline is duplicative.

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 265 PL-TES-6 New	**Guideline** Timber harvest and associated vegetation activities should avoid the occupied habitat of threatened, endangered, and sensitive plant species (minimum 100 foot buffer), unless the silvicultural prescription will benefit the species or its habitat.	Alt E modified: **Guideline** Timber harvest and associated vegetation activities should avoid the occupied habitat of threatened or endangered species, unless the silvicultural prescription will benefit the species or its habitat.	ESA Formal consultation will address this on a project-specific basis, making this guideline unnecessary. Remove "sensitive species" as this category is too broad and should be eliminated from the document altogether. Remove arbitrary 100-foot buffer. We agree that silvicultural management will often benefit the species and habitat.
p. 265 PL-TES-7 New	**Guideline** Slash piles and other fuels should be managed to avoid the occupied habitat of threatened, endangered and sensitive plant species (minimum 100 foot buffer).	Alt E modified: **Guideline** Slash piles and other fuels should be managed to avoid the occupied habitat of threatened and endangered plant species.	ESA Formal consultation will address this on a project-specific basis, making this guideline unnecessary. Guideline should not have prescriptions such as 100 foot buffer. Sensitive plants should be removed; category is too broad.
p. 265 PL-TES-8 New	**Guideline** Wildlife fire (planned and unplanned) suppression lines should not be constructed within occupied habitat of threatened, endangered, and sensitive species.	No corresponding standard/guide	Catastrophic wildfire is one of the primary threats to many endangered species, as well as to other multiple uses of the forest. Restrictions that limit wildfire prevention or suppression activities should not be implemented.
p. 265 PL-TES-9 New	**Guideline** New road construction should be designed to avoid the occupied habitat of threatened, endangered, and sensitive plant species (minimum 25-foot buffer).	Alt E modified: **Guideline** New road construction should be designed to avoid the occupied habitat of threatened or endangered, plant species except where a road or trail would help prevent or suppress wildfire or where needed to utilize a prior existing right.	ESA Formal consultation will address this on a project-specific basis, making this guideline unnecessary. The 25-foot buffer is without scientific basis. Remove "sensitive species" as this category is too broad and should be eliminated from the document altogether.
p. 266 PL-TES-10 New	**Guidance** All new trail construction should be designed to avoid the occupied habitat of threatened, endangered, and sensitive plant species (minimum 25-foot buffer).	Alt E modified: **Guideline** New trail construction should be designed to avoid the occupied habitat of threatened or endangered, plant species except where a road or trail would help prevent or suppress wildfire or where needed to utilize a prior existing right.	ESA Formal consultation will address this on a project-specific basis, making this guideline unnecessary. The 25-foot buffer is without scientific basis. Remove "sensitive species" as this category is too broad and should be eliminated from the document altogether.

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 266 PL-TES-11 New	**Guideline** Land exchanges should avoid the disposition of occupied habitat of threatened, endangered, and sensitive plant species.	No corresponding Guideline	Baker County's private lands are generally better managed than federal lands. The federal government should not limit itself from opportunities to dispose of the lands it currently manages.
p. 266 FIRE-2 S-8	**Guideline** Minimum Impact Suppression Tactics (MIST) should be utilized in sensitive areas, such as designated wilderness areas, designated wild and scenic river corridors, research natural areas, botanical areas, riparian management areas, cultural and historic sites, developed recreation areas, special use permit areas that have structures, and historic and recreational trails. MIST techniques should also be used for post fire restoration activities.	No corresponding Guideline	MIST is overly restrictive and does not allow all available tools to be used to stop devastating wildfires. We believe that, by implementing MIST in special designation areas as well as riparian areas, USFS would put at risk Baker County citizens' health, safety and wellbeing.
p. 266 FIRE-3 G-28	**Guideline** Mechanical fireline should not be constructed in areas with greater than 35 percent slope or on highly erodible soils unless potential adverse effects can be mitigated.	**Alt E modified:** **Guideline** Mechanical fireline should not be constructed in areas with greater than 35 percent slope or on highly erodible soils unless potential adverse effects can be mitigated or unless circumstances preclude other means of suppressing unwanted wildfire.	
p. 266 FIRE-4 New	**Guideline** Greater sage-grouse habitat should be identified in fire management plans and should be given high priority for protection.	**Alt E modified:** **Guideline** Greater sage-grouse habitat should be identified in fire management plans and should be given high priority for protection, second to human safety and property."	While we recognize the intent of preventing an ESA listing of the Sage grouse, we also point out that provisions such as this are short-sighted in that they place all focus on one species. Single-species focus will only serve to create imbalance in forest management, in the long-term.
p. 268 NOX-2 G-29 Changed to Standard	**Standard** Materials used for construction or restoration projects on National Forest System lands shall be free of invasive species.	Alt E modified: convert to **Guideline**	This should remain a guideline. While avoiding invasive seeds is good practice, making this a standard will create a legal liability for USFS while doing nothing to improve enforcement of the guideline.

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
NOX-3 G-36 Changed to Standard	**Standard** All activities shall be conducted to minimize or prevent the potential spread or establishment of invasive species.	Alt E modified: convert to **Guideline**	This should remain a guideline. While avoiding invasive seeds is good practice, making this a standard will create a legal liability for USFS while doing nothing to improve enforcement of the guideline.
p. 268 FOR-1 S-11	**Standard** Clearcutting, shelterwood, and other even-aged regeneration harvest methods shall be used only when an interdisciplinary team/line officer has determined that protection can be assured for resources, such as soil, watershed, fish, wildlife, recreation, aesthetics, and the regeneration of the timber resource. It shall also be determined as the optimal harvest method.	No corresponding S/G	Each of these STANDARDS (FOR-1-5) imposes restrictions that could foreclose management options that would contribute to the recovery of historic range of variability and forest resilience. They appear to be arbitrary and provide a back door to prescriptive governance over forest management. FOR-2, in particular is far too prescriptive. They are not appropriate for our forests, the bulk of which are at high risk of destruction by catastrophic wildfire. Their implementation would necessarily drastically reduce the amount of timber harvest in Baker County, resulting in damaging social, economic and environmental effects.
p. 269 FOR-2 S-12	**Standard** Forest openings created by the application of even-aged regeneration harvest methods shall be limited to a maximum size of 40 acres. Exceptions are permitted on an individual basis after a 60-day public notice period and review by the regional forester. This maximum size opening limitation does not apply to areas harvested after large scale disturbances resulting from wildfire, insects, disease, windthrow, or other catastrophic events.	No corresponding S/G	
p. 269 FOR-3 S-13	**Standard** Cut blocks, patches, or strips created by the application of even-aged regeneration harvest methods shall be shaped and blended with the natural terrain.	No corresponding S/G	
p. 269 FOR-4 S-14	**Standard** Areas that are harvested using even-aged regeneration harvest methods on lands identified as suitable for timber production shall be capable of being adequately restocked within five years of final harvest. Adequately restocked is based on national forest or regional stocking standards.	No corresponding S/G	

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 270 FOR-5 G-37	**Standard** Stands shall generally have reached the culmination of mean annual increment of growth as per NFMA sec.6 (m) prior to harvest. This does not preclude the use of thinning or other stand improvement measures or salvage or sanitation harvesting of timber stands that are substantially damaged by fire, windthrow, or other catastrophic events or that are in imminent danger of insect or disease outbreaks. Exceptions: after consideration of multiple uses, include other activities, such as cutting for experimental and research purposes, removing particular species of trees, improving wildlife habitat, range, or recreation resources.	No corresponding S/G	
p. 271 FOR-9 G-41	**Guideline** Timber harvest should not cause irreversible damage to soil, slope, or other watershed conditions.	No corresponding S/G	This guideline is unnecessary. Timber projects that abide by other standards and guidelines will not do "Irreversible damage" to said resources. This term is subjective in the first instance, and should not be included. The closest Baker County's forests will come to being "irreversibly damaged" is when they are affected by catastrophic wildfire that sterilizes the soil.
p. 271 FOR-10 G-42	**Guideline** Timber harvest on lands not suitable for timber production should occur only to meet multiple-use purposes other than timber production.	Alt E modified: **Guideline** Timber harvest may occur on lands not suitable for timber production in order to meet multiple-use purposes other than timber production.	

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 272 RNG-2 G-44	**Guideline** New fences should be designed to accommodate wildlife movement. In greater sage-grouse habitat, fence construction within 1 mile of known leks (protected activity centers) and seasonal high use areas should not be authorized or allowed. Fence construction on the crest of low hills should not be authorized or allowed unless the fence is marked with anti-strike markers.	Alt. E Modified: **Guideline** New fences should be designed to accommodate <u>sage grouse movement near leks.</u> In greater sage-grouse habitat, <u>new</u> fence construction within 1 mile of known leks (protected activity centers) and seasonal high use areas should not be authorized or allowed <u>unless they contribute to improved grazing management</u>. <u>New</u> fence construction on the crest of low hills should not be authorized or allowed unless the fence is marked with anti-strike markers.	Designing fences "to accommodate wildlife movement" may be an overly-broad statement if the goal is simply to accommodate sage grouse where they will be flying frequently. Fences are an important aspect of proper grazing management and should be constructed where needed after coordination and consultation with affected permittee(s) and the County.
p. 272 RNG-3 G-45	**Guideline** All new water developments should provide for small mammal and bird escape.	Alt E modified: **Guideline** All new water developments should provide for small mammal and bird escape, and should be installed and funded by USFS after consultation with affected permittee.	Ranchers perform important stewardship activities but are not responsible for bearing the cost of accommodating wildlife.
p. 272 RNG-4 G-46	**Guideline** In areas classified as less than fully capable or suitable, only limited grazing should be authorized or allowed only after the limitations of the site are considered in designing the site-specific allotment management plan.	Alt E modified **Guideline** In areas classified as unsuitable, only limited grazing should be authorized or allowed only after the limitations of the site are considered in designing the site-specific allotment management plan, and after coordination with the county.	"Less than fully capable or suitable" is too vague.

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 273 RNG-5	(Table): **Guideline** for utilization levels. Season-long grazing regimes on areas with low departure from desired condition: 35% utilization allowable. Season-long grazing regimes on areas with moderate or greater departure from desired condition: 30%. Management regimes with deferment/rest/rotation that have low departure from desired conditions: 40%. Those with moderate or greater departure from DC: 35%.	**Alt E modified: Guideline** Scientifically-sound utilization levels and monitoring techniques should be agreed upon by County and, when possible, the permittee. (See Appendix B for suggested utilization levels.)	Ocular measurement is too subjective. Coordination with county and consultation with permittee should determine science-based monitoring method. Low-moderate-greater departure from desired condition is not defined. Coordination with county should define this, as well as what the desired conditions are. Utilization levels are too low and are not based on a balanced consideration of range science. These levels will encourage wildfire in many cases and will detract from healthy grass and forbs growth. Furthermore, utilization should not be a number, but rather a range of use to achieve proper use that effectively addresses the needs of the plant community and the season of use it is applied to (i.e., 40-60%). See more in our Grazing Concerns section. The document states repeatedly that there are upward trends in range health. This has been the case even as utilization levels have well exceeded 40%.
p.273 RNG-6 G-47	**Guideline** Upland shrub utilization should not exceed 40 percent as determined by any science-based method.	**Alt E modified: Guideline** Scientifically-sound utilization levels and monitoring techniques should be agreed upon by County and, when possible, the permittee. (See Appendix B for suggested utilization levels.)	Utilization level is too low and not based on a balanced consideration of range science. See above comments. This level will encourage wildfire in many cases and will detract from healthy grass and forbs growth. Also, we assume the language "as determined by any science-based method" refers to monitoring methods. Not all methods are created equal. Even proven techniques can fail if they are used on inappropriate sites.

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 274 RNG-7 *New*	**Guideline** Grazing utilization within occupied greater sage-grouse habitats should not exceed 40 percent at any time during the grazing season and will be determined specifically for each greater sage-grouse habitat, i.e., grazing utilization measured as an average of the entire pasture or grazing unit will not be used to determine compliance with this guideline.	No corresponding S/G.	We do not believe that setting a prescriptive utilization level is suitable for a guideline. See above comments on the inappropriateness of applying one utilization number, versus a range, to broad areas. If sage grouse exist in areas currently grazed at levels above 40%, we question the wisdom in reducing those levels. The proposed percentage is presumably drawn from Holechek, whose research took place largely in AZ and NM and is not appropriate. Also, if 40% utilization is reached in a "a" sage-grouse habitat, how may grazing continue on other parts of that pasture without fencing? This aspect of the guideline is not practical.
p. 274 RNG-8 *New*	**Guideline** During greater sage-grouse breeding season, livestock turnout and trailing should avoid concentration on known greater sage-grouse leks (protected activity centers).	Alt E modified: **Guideline** When considering changes to historic turnout or trailing practices, sage grouse leks should be avoided during the breeding season, if possible.	Most trails and turnout areas are historical. If leks have established under those conditions, changing practices should only serve to alter conditions and thus threaten leks. Heavily grazed areas are often optimum lek sites.
p. 274 RNG-9 S-2	**Standard** Domestic Sheep or goat grazing shall not be authorized or allowed on lands where effective separation from bighorn sheep cannot be reasonably maintained.	No corresponding S/G.	Decisions requiring bighorn sheep (BHS)/domestic sheep separation should not be made by USFS. See our comments on BHS in the Grazing Concerns section.
p. 274 RNG-10 S-3	**Standard** The use of domestic goats or sheep for manipulation of vegetation (ie noxious weed control, fuels reduction) shall not be authorized or allowed within or adjacent to source habitat for bighorn sheep.	No corresponding S/G.	This is duplicative of the above. Livestock grazing has long been recognized as an effective tool for controlling invasives (Launchbaugh 2007). See above comments for why complete separation is unnecessary. Furthermore, "adjacent to source habitat" is a vague an potentially vast area.
p. 275 RNG-12 New	**Standard** An effective monitoring program shall be in place to detect presence of bighorn sheep in identified high-risk areas when authorized domestic sheep or goats are present on adjacent or nearby allotments.	No corresponding S/G.	Who will do this monitoring? Funding for monitoring is already inadequate. Will grazing be disallowed if an "effective" monitoring program is not in place? "High-risk" area is not defined. How would sheep being adjacent to high-risk areas be a problem, and what is the meaning of "adjacent to"? We cannot meet these vague standards.

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 275 RNG-13 New	**Guideline** Trailing of domestic sheep or goats should not be authorized or allowed within 7 miles of bighorn sheep home ranges.	No corresponding S/G.	There is no scientific basis for this buffer zone, especially for the trailing of sheep, where there won't be prolonged contact (the most likely to result in disease transfer).
p. 275 RNG-14 New	**Standard** When effective monitoring has not been conducted for bighorn sheep presence, domestic sheep or goat grazing shall not be authorized.	No corresponding S/G.	See notes on RNG-12
p. 275 RNG-16 New	**Standard** When permitted sheep are found to be missing, the Forest Service shall be notified within 24 hours.	Alt E modified **Guidance** When permitted sheep are found to be missing, the Forest Service shall be notified within 24 hours.	While it is reasonable to ask a rancher to report missing sheep within 24 hours, these areas are remote and this may not be possible. This should be recast as guidance.
p. 276 RNG-17 New	**Standard** Authorized domestic sheep or goats shall be individually marked in a manner that allows immediate identification of ownership at a distance during the grazing season at all times while on NFS lands.	No corresponding S/G.	This is a very unreasonable request. Sheep are required to have a paint brand, registered with the state, in order to be on USFS land. This should be sufficient.
p. 276 RNG-18 New	**Standard** Implement emergency actions when bighorn sheep presence is detected within 7 miles of active domestic sheep or goat grazing or trailing. Actions to be taken shall ensure separation between bighorn sheep and domestic sheep or goats.	No corresponding S/G.	No scientific basis for this buffer. Making it a standard to "ensure" separation automatically means the sheep industry is doomed.

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 276 RNG-19 New	**Guideline** To maintain separation, when bighorn sheep are found within 7 miles of an active domestic sheep and goat allotment, implementation of emergency actions for domestic sheep and goat grazing could include: Reroute (move) domestic sheep or goats to a new routing path that will take them away from the likely bighorn movement; this may involve rerouting within the permitted allotment, movement to a different allotment, or, if the situation cannot otherwise be resolved, moving the permitted sheep off of the national forest until the situation can be resolved Inform the appropriate state agency of the bighorn sheep location	No corresponding S/G.	This is entirely unreasonable. See notes above. This would eliminate the sheep industry on USFS land, as alternative pasture is not likely to be found for thousands of sheep. If this were to be implemented, we would demand that alternative allotments be found for those sheep in a timely manner that does not put undue pressure on producers.
p. 277 KW-1 S-15	**Standard** There shall be no net increase in the mileage of Forest Roads in any key watershed unless the increase results in a reduction in road-related risk to watershed condition. Priority should be given to roads that pose the greatest relative ecological risks to riparian and aquatic ecosystems.	Alt E modified: **Guideline** Any increases in the mileage of Forest Roads in any key watershed should not result in substantial road-related risk to watershed condition.	"Priority should be given to roads that pose the greatest relative …risks…" Does this imply that roads will be decommissioned? No road decommissioning should take place without coordination with the affected county. We suggest removing this sentence.
p. 278 KW-2 S-16	**Standard** Hydroelectric and other surface water development authorizations shall include requirements for in-stream flows and habitat conditions that maintain or restore native fish and other desired aquatic species populations, riparian dependent resources, favorable channel conditions, and aquatic connectivity.	No corresponding S/G.	USFS asserts that surface water development authorizations "shall include requirements" for in-stream flows, habitat conditions, connectivity, etc.—without giving specifics as to what those "requirements" would be. This is a terribly vague standard that also usurps the State's authority over water rights. Furthermore, USFS cannot control every variable regarding desired fish populations. No matter the conditions or the design and function of surface water developments, fish may or may not thrive based on a large number of variables outside USFS' control. Terms such as "favorable channel conditions" are far too subjective to be included in a standard.

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 278 KW-3 S-17	**Standard** New hydroelectric facilities and water developments shall not be located in a key watershed unless it can be demonstrated that there are minimal risks and/or no adverse effects to the fish and water resources for which the key watershed was established.	No corresponding S/G.	The concept of "Key Watersheds" is flawed. Watersheds were not "established" by USFS, nor can USFS declare that fish habitat is the sole "purpose" of a watershed. USFS should be focusing on multiple uses that will benefit the human population. This includes both keeping water resources healthy and allowing for new energy sources that will benefit Baker County residents.
Page 279WR-3	**Guideline** Hydrologic connectivity and sediment delivery from roads and trails should be minimized. This includes roads inside and outside of riparian management areas.	**Alt E modified** **Guideline** Hydrologic connectivity and sediment delivery from roads and trails should be analyzed in coordination with the county on a site-specific basis, and addressed where necessary.	This guideline is not acceptable. Not all roads inside riparian corridors are problem roads. Almost none of the roads outside riparian corridors (exception would be in areas of very steep ground) are problem roads. This guideline needs to be rewritten to indicate that hydrologic connectivity should be evaluated on a site specific basis.
P. 279 OF-1 G-59	**Guideline** Management activities within and outside old forest stands should generally emphasize retaining old trees of desirable species. For most species, old trees are generally considered to be greater than 150 ears in age and may exhibit certain old tree characteristics. However, these old tree characteristics may vary by site and should be further developed on a project-specific basis.	Alt E modified: **Guideline** Management activities within old forest stands should generally emphasize retaining old trees of desirable species. For most species, old trees are generally considered to be greater than 150 ears in age and may exhibit certain old tree characteristics. However, these old tree characteristics may vary by site and should be further developed on a project-specific basis.	"Within and outside" old forest stands is too broad. On page iii-iv (Vol 1), for Alternatives D-F, the document states there will no longer be designated old forest management areas. This is a good thing. Timber management activities should take place in these areas. However, the document describes a "legacy tree" as a live tree over 21 inches—then states in this guideline that these will be protected. That puts us back where we started. The definition of a legacy tree should be changed to include only trees over 21 inches dbh that are healthy, produce cones and are without disease or dead top.
p. 279 OF-2 New	**Guideline** New motor vehicle routes should not be constructed within old forest stands.	No corresponding S/G.	"Old forest stands" is a vague term and could conceivably cover very large areas. This guideline could therefore prevent road construction important to the protection of the forest (wildfire suppression and logging) and economic activities, including preexisting rights.
p. 281 MA 1A WIL-5 G-64	**Guideline** States no tethering of animals within 200 feet of lakes.	Alt E modified **Guideline** States no tethering of animals within 50 feet of lakes.	

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 282 MA 1A WAW-WIL-1 S-20 (Wildernesswithin WWNF)	**Standard** Visitors must obtain and possess an entry permit	No Corresponding S/G	No permits should be required to access wilderness except in the case as happens on wild and scenic rivers where permit fees are used to provide sanitary facilities for rafters and other river users.
p. 282 MA 1A WAW-WIL-2 S-21	**Standard** Campfires not authorized within 100 feet of lakes	Alt E modified **Standard** Campfires not authorized within 50 feet of lakes	
p. 283 **MA 1A WAW-WIL-4 S-23**	**Standard** Grazing of horses shall not be allowed with 200 feet of any lake in the Eagle Cap Wilderness Area	Alt E modified **Standard** Grazing of horses shall not be allowed with 50 feet of any lake in the Eagle Cap Wilderness Area	
p. 283 **MA 1A WAW WIL-7 S-27**	**Standard** Party size no more than 6 allowed	Alt E modified **Standard** Party size no more than 12 allowed	Should be the same as #S-26 Party size 12. However, if no permits are required, this becomes irrelevant.
MA 1A WIL-FIRE-1 G-65	Standard All firelines should be restored	Alt E modified **Guideline** Firelines should remain open for firewood collection and restoration work	
p. 285 WIL-ST-1 G-71	**Guideline** Existing and proposed uses that could compromise wilderness eligibility prior to congressional designation should not be authorized.	No corresponding S/G	If *existing* uses would threaten an area's designation as wilderness, that area obviously should not have qualified as a recommended/study area. On p. 190, Vol. 1, report findings reveal that additional wilderness designation is not necessary within the Blue Mountain national forests.
MA 2A WSR-3 G-73	Guideline Must use designated stock facilities only for hitching horses	Alt E modified **Guideline** allow hitching of horses within 50 feet of water areas	This is not workable because there are not enough stock facilities thru out the areas. Must be allowed to hitch horses within 50 feet of water areas
MA 2A WSR-6 G-76	**Guideline** Timber harvest roads should not be constructed in wild and scenic river corridors.	**Alt E modified Guideline** Timber harvest roads should not be constructed in wild and scenic river corridors except for purposes of fuel reduction or existing rights.	

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 287 **MA 2A** **WSR-8 G-78**	**Guideline** The construction of roads and river crossings that are visible from the river corridor should not be allowed	**Alt E modified Guideline** The construction of roads and river crossings that are visible from the river corridor should not be allowed, unless necessary to satisfy existing rights.	
p. 287 **MA 2A** **WSR-11 S-36**	**Standard** Oil and gas leasing shall not be allowed with 1320 feet of high water mark	**Alt E modified Guidance** Oil and gas leasing shall be allowed at distances that do not inhibit WSR purposes, on a site-specific basis and in coordination with the County.	
p. 288 **MA 2B** **RNA-1** **New**	**Standard** Management activities that modify ecological processes shall not be allowed	No corresponding S/G	Baker County opposes the creation of RNAs, for the very reason that they restrict "management activities that modify ecological processes." Such activities are necessary for the safety and wellbeing of our residents, as well as their very way of life. Losing activities such as logging, mining and grazing detracts from our economy and our safety, in light of the increased risk of catastrophic wildfire. As stated by the USFS website, "RNAs are protected against human activities that directly or indirectly modify their ecological integrity…" (http://www.fs.fed.us/rmrs/research-natural-areas/about/). We disagree with this designation, which is an effective Wilderness designation, but without the deliberation of Congress. The USFS websites states, "It has been especially challenging to secure RNA designations in the most productive forest and rangeland ecosystems where commodity uses have been concentrated." This is as it should be; the national forests were established by the Organic Administration Act (OAA) of 1897, 16 U.S.C § 475, for two primary purposes: to conserve water flows, and to furnish a continuous supply of timber for the American people. Research in RNAs should be geared toward the achievement of those dual goals. Such has not been the case.

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 288 MA 2B RNA-2 G-86	**Guideline changed to standard** Mineral exploration shall minimize impacts to research areas	No corresponding S/G	The County opposes such restrictions; see comment on RNA-1.
p. 288 MA 2B RNA-3 G-87	**Guideline changed to standard** Removal of common mineral material shall not be allowed	No corresponding S/G	The County opposes such restrictions; see comment on RNA-1.
p. 289 MA 2C Botanical areas MA 2C BOT-3 G-93	**Guideline** Silvicultural treatments should be allowed only when designed to enhance the special features of botanical areas.	No corresponding S/G	Baker County disagrees with these guidelines, as they all negatively affect our residents' use and enjoyment of the WWNF. Botanical areas represent another special designation that has the potential to severely restrict Baker County residents' use, enjoyment, and safety by minimizing uses such as timber management, grazing, and mining.
p. 289 MA 2C BOT-4 G-94	**Guideline** Firewood collection should not be authorized or allowed within botanical areas.	No corresponding S/G	
p. MA 2C BOT-6 G-96 289	**Guideline** Removal of common mineral material should not be authorized or allowed within botanical areas	No corresponding S/G	
p. 290 MA 2C BOT-7 G-97	**Guideline** Botanical areas should be managed as avoidance areas for utility corridors.	No corresponding S/G	
p. 291 STA EXP-4 New	**Standard** Vehicle access shall only be allowed on designated routes, unless necessary to meet research needs or objectives	**Alt E modified: Guideline** Vehicle access shall only be allowed on designated routes, unless necessary to meet research needs or objectives, fight fire, or satisfy existing rights.	
p. 291 STA EXP-4 New	**Standard** Starkey EFR shall be closed to public access from fall until spring to protect deer and elk from harassment and stress during winter, with specific dates established periodically as consistent with research objectives.	No corresponding S/G	WWNF deer and elk populations are thriving. No such restrictions are necessary.
p. 291 STA EXP-4 New	**Guideline** Existing old growth should be retained and additional stands that are the closest to old growth structure should be retained at a rate of 20 percent of the land area.	**Alt E modified: Guideline** Existing old growth should be retained.	"Stands that are the closets to old growth structure" – this is an impossibly vague guideline that should be deleted.

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 292 MA 3A/B BACK-1 S-58 (Backcountry nonmotorized and motorized)	**Standard** Silvicultural treatments shall generally be limited to small diameter material and may take place only for the following reasons: To improve habitat for species with viability concerns, restore terrestrial or aquatic ecosystem composition and structural characteristics, or to maintain existing unique or important wildlife features or plant communities. Appropriate administrative use When cutting, sale, or removal of timber is incidental to the implementation of another suitable management activity	No corresponding S/G	The two "backcountry" designations proposed by USFS violate the agency's multiple-use mandate, as exemplified by this standard. To limit timber management to solely "ecosystem" purposes is blatantly against USFS' primary purpose of providing a steady supply of timber to the American people. The MA 3A/B designations should be discarded altogether.
p. 293 MA 3A/B BACK-2 S-59	**Standard** New road construction shall be limited to that required for designated special uses or required by law to provide access to non-Federal land or valid existing rights.	No corresponding S/G	See comment on **MA 3A/B BACK-1 S-58**
p. 293 MA 4B RMA-1 G-101 (Riparian Management Areas)	**Guideline** When riparian management areas are functioning properly, project activities should be designed to maintain those conditions. When riparian management areas are not properly functioning, project activities should be designed to improve those conditions. Project activities in RMAs should not result in long-term degradation to aquatic and riparian conditions at the watershed scale. Limited short term or site-scale effects from activities in RMAs may be acceptable when they support, or do not diminish long-term benefits to aquatic and riparian resources.		USFS proposes to unilaterally turn riparian areas (or, in many cases, non-riparian areas that nonetheless fall under the proposed RMA definition) into non-multiple-use areas. While we understand and agree that properly functioning riparian areas are in the best interest of Baker County residents, we simply observe that none of the standards or guidelines for RMAs make mention of USFS' mandate to provide social and ecological benefits to the people. This oversight must be righted in future planning efforts.

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 294 MA 4B RMA-2 S-41	**Standard** Herbicides, insecticides, pesticides and other toxicants, and other chemicals shall be applied only to maintain, protect, or enhance aquatic and riparian resources or to restore native plant communities.	**Alt E modified: Guideline** Herbicides, insecticides, pesticides and other toxicants, and other chemicals shall be applied only to maintain, protect, or enhance aquatic and riparian resources or to restore native and desired non-native plant communities.	
p. 294 MA 4B RMA-4 G-103	**Guideline** Water drafting sites should be located and managed to minimize adverse effects on stream channel stability, sedimentation, and in-stream flows needed to maintain riparian resources, channel conditions, and fish habitat.	**Guideline** Water drafting sites should be located and managed to minimize adverse effects on stream channel stability and sedimentation.	Regulating in-stream flows is the state's responsibility and beyond the authority of USFS.
p. 295 MA 4B RMA-FIRE-1 G-104	**Guideline** Disturbed areas, such as firelines, drop-points, camps, roads, and trails, should be restored by actions such as scattering slash piles, replacing logs and boulders, scarifying soils, recontouring terrain, and reseeding with native species	**Guideline** Disturbed areas, such as firelines, drop-points, camps, roads, and trails, should be restored by actions such as scattering slash piles, replacing logs and boulders, scarifying soils, recontouring terrain, and reseeding with native and desired non-native species	
p. 297 MA 4B RMA-FIRE-10 S-45	**Standard** Minimum Impact Suppression Tactics (NWCG 2006) techniques for wildfire suppression activities shall be used in riparian management areas.	No corresponding S/G.	As noted above, we do not believe use of MIST in RMAs is appropriate.
p. 297 MA 4B RMA-FIRE-11 S-46	**Standard** To minimize soil damage when chipping fuels within RMAs, chip bed depth on dry soils shall be limited to 7.5 cm or less (Busse et al. 2005)	**Alt E modified: Guideline** To minimize soil damage when chipping fuels within RMAs, chip bed depth on dry soils shall be limited to 7.5 cm or less (Busse et al. 2005)	

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 297 MA 4B RMA-FOR-1 G-112	**Guideline** Silvicultural treatments should occur on RMAs only as necessary to maintain, restore or enhance conditions that are needed to support aquatic and riparian dependent resources.	**No corresponding S/G**	See comment on **MA 4B RMA-1 G-101**
p. 298 MA 4B RMA-FOR-2 S-47	**Standard** Firewood collection shall not be authorized or allowed in the active floodplain or within primary source areas for large woody debris. Active floodplain is the area bordering a stream that is inundated by flows at a surface elevation defined by two-times the maximum bankfull depth (ie, bankful depth measured at thalweg).	**No corresponding S/G**	This standard is a demonstration of the DEIS' numerous proposals to implement incomprehensible, unknowable standards that will serve only to incriminate Baker County residents.
p. 298 MA 4B RMA-RNG-1 S-48	**Standard** New livestock handling and/or management facilities shall be located outside RMAs, except for those that inherently must be located in an RMA and those needed for resource protection.	**Alt E modified: Guideline** New livestock handling and/or management facilities should be located outside RMAs, except for those that inherently must be located in an RMA and those needed for resource protection.	

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 299 MA 4B RMA-RNG-2 G-115	**Guideline** (Table A-55a) Maximum utilization within RMAs for both Woody vegetation and herbaceous vegetation (percent of mean annual vegetative production): 25% within bull trout spawning and rearing reaches. 40% for all other watercourses including anadromous fish reaches. In addition, the minimum residual stubble height (applies at the greenline) for all alternatives is 4-6 inches. The max bank alternation is 20 percent	**Alt E modified: Guideline** Scientifically-sound utilization levels and monitoring techniques should be agreed upon by County and, when possible, the permittee. (See Appendix B for suggested utilization levels.)	The plan states that riparian areas and rangeland are on an upward trend. If this is the case, why does USFS propose to decrease utilization standards? Utilization: Utilization levels are too low and are not based on a balanced consideration of range science. These levels will encourage wildfire in many cases and will detract from healthy grass and forbs growth. Furthermore, utilization should not be a number, but rather a range of use to achieve proper use that effectively addresses the needs of the plant community and the season of use it is applied to (i.e., 40-60%). See more in our Grazing Concerns section. Bull trout: p. 308 Vol 1 states there are 53 subwatersheds containing bull trout (640,000 acres, 36 percent of forest area). This is a huge area. The 25% utilization level, in most cases, will make it uneconomical for most operators in bull trout "habitat" to turn out at all. There is no scientific basis for this standard. Stubble height: While USFS should monitor stubble height for green line, grass and forb height must be determined by species, ecological site, site potential and weather. Many sites have mixed grass species due to many factors and the attribute must be carefully defined prior to any assessment. A bluebunch site may achieve a mature height of 10-12 inches, but some sites with a mixture of grass species achieve a mature height of 7-8 inches. Other sites achieve even less. The same pattern is true for forb species. Further, mixing the different forb species will not accurately assess forb height, rendering the information arbitrary and ineffective at providing an assessment. Stream bank alteration: While bank alteration should be used to monitor conditions, the 20% bank alteration standard has no scientific basis and should not be included in the forest plan.

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 300 MA 4B RMA-RNG-3 G-116	**Guideline** During allotment management planning, removing existing livestock handling or management facilities from RMAs should be considered.	No corresponding S/G	Riparian area conditions are currently trending up. This is unnecessary, and will only serve to detract from activities crucial to proper livestock management, and thus range health. Removal of these facilities threatens to add cost and difficulty to producers, which could in turn result in their inability to utilize their grazing rights.
p. 300 MA 4B RMA-RNG-4 G-117	**Guideline** Livestock trailing, bedding, watering, loading, and other handling in RMAs should be minimized.	No corresponding S/G	RMAs are defined so broadly that this guideline will necessarily eliminate large portions of producers' ranges.
p. 300 MA 4B RMA-RNG-5 G-118	**Standard** Trampling of federally listed threatened or endangered fish redds by livestock shall be avoided.	No corresponding S/G	This is duplicative and unnecessary. Other S/Gs address the protection of ESA species. Furthermore, making this a standard implies a zero-tolerance policy that will completely preclude livestock access to waterways that *may* harbor redds.
p. 300 MA 4B RMA-RD-1 S-49	**Standard** Side-casting (placement of unconsolidated earthen waste materials resulting from road construction or maintenance) in RMAs shall be avoided.	**Alt E modified : Guideline** Side-casting (placement of unconsolidated earthen waste materials resulting from road construction or maintenance) in RMAs should be avoided when feasible, considering added costs of moving materials, and with the requirement that valid existing rights be satisfied.	Such a requirement could make road construction and maintenance prohibitively expensive. USFS proposes to add costs to this activity at the same time that it cites inadequate budgets to maintain existing roads.
p. 300 MA 4B RMA-RD-2 S-50	**Standard** Fill material shall not be placed on organic debris in RMAs	**Alt E modified : Guideline** Fill material should not be placed on organic debris in RMAs when feasible, considering the associated costs. Valid existing rights must be satisfied.	See above comment.

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 301 MA 4B RMA-RD-3 S-51	**Standard** Disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow shall be minimized or avoided when constructing or recontruscting roads or landings either inside or outside of RMAs.	**Alt E modified:** **Guideline** Disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow should be minimized when constructing or recontruscting roads or landings in RMAs.	Placing this in the RMA category implies it will apply to RMAs only. Why state "either inside or outside of RMAs"?
p. 301 MA 4B RMA-RD-4 G-120	**Guideline** Wetlands and unstable areas should be avoided when reconstructing existing roads or constructing new roads and landings. Minimize impacts where avoidance is not practical.	**Alt E modified:** **Guideline** Wetlands and unstable areas should be avoided when constructing new roads and landings. Minimize impacts where avoidance is not practical.	If existing roads are in "wetlands or unstable areas," their reconstruction will necessarily fall in those areas. If those roads needed where they are, measures can be taken to minimize their effects on said areas.
p. 301 MA 4B RMA-RD-5 S-52	**Standard** New or replaced permanent stream crossings shall accommodate flows at least 20 percent greater than the 100-year flood event, including associated bedload and debris.	**Alt E modified:** **Guideline** New or replaced permanent stream crossings shall accommodate flows such that they can accommodate 100-year flood events.	Allowing for flows at least 20 years greater than the 100-year flood event is excessive and will add unnecessary cost and/or could preclude crossing construction.
p. 301 MA 4B RMA-RD-6 S-53	**Standard** Where physically feasible, construction or reconstruction of stream crossing shall avoid diversion of streamflow out of the channel and down the road in the event of crossing failure.	**Alt E modified** **Guideline** Where physically feasible, construction or reconstruction of stream crossing shall avoid diversion of streamflow out of the channel and down the road in the event of crossing failure.	
p. 301 MA 4B RMA-RD-7 S-54	**Standard** In fish bearing streams, construction or reconstruction of stream crossing shall provide and maintain passage for all fish species and all life stages of fish.	**Alt E modified:** **Guideline** In fish bearing streams, construction or reconstruction of stream crossing should provide and maintain passage for all fish species and all life stages of fish.	

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 306 MA 4B RMA-HYD-1 S-56	**Standard** Authorizations for all new and existing special uses, including, but not limited to water diversion or transmission facilities (e.g., pipelines and ditches), energy transmission lines, roads, hydroelectric, and other surface water development proposals, shall result in the reestablishment, restoration, or mitigation of habitat conditions and ecological processes identified as being essential for the maintenance or improvement of habitat conditions for fish, water and other riparian dependent species and resources. These processes include in-stream flow regimes, physical and biological connectivity, water quality, and integrity and complexity of riparian and aquatic habitat.	No corresponding S/G	The placement of this standard in the "hydropower" section is inappropriate and appears intended to cloak the broad scope of the standard. Authorizations of *all new and existing special uses* includes almost any conceivable activity on the forest, including existing water rights that are perfected via a special use permit (for maintenance of pipelines and ditches, for example). "*…shall result in the reestablishment, restoration, or mitigation of habitat conditions and ecological processes identified as being essential for the maintenance or improvement of habitat conditions for fish, water and other riparian dependent species and resources.*" **Comment**: Who will "identify" the ecological processes that are "essential" for the said purposes? This is completely subjective, which makes all activities on RMAs that require special use permits subject litigation. "…essential maintenance or improvement" implies conditions could be good, but improvements COULD be made. The possibility for "improvement" is limitless. Must all new and existing uses result in the "improvement" of habitat conditions? "*These processes include in-stream flow regimes, physical and biological connectivity, water quality, and integrity and complexity of riparian and aquatic habitat.*" **Comment**: regulation of these features is not within the authority of USFS. "Integrity and complexity of riparian and aquatic habitat"- this is incomprehensible. It holds no meaning, yet it is cast as part of a standard. The entire standard should be discarded.

Reference	USFS Preferred Alternative (Alt. E)	BC Preferred Alternative	Comments
p. 306 MA 4B RMA-HYD-2 S-57	**Standard** New support facilities shall be located outside of RMAs. Support facilities include any facilities or improvements (eg, workshops, housing, switchyards, staging areas, and transmission lines) not directly integral to the production of hydroelectric power or necessary for the implementation of prescribed protection, mitigation or enhancement measures.	**Alt E Modified: Guideline** New support facilities not directly integral to the production of hydroelectric power should be located and operated in a manner that does not compromise riparian areas. Riparian areas should be determined on a site-specific basis.	RMAs are defined so broadly as to make the construction of support facilities impossible within a reasonable distance. This may inadvertently prevent efficient hydropower production, or any hydropower production at all. This will certainly be the case if structures such as transmission lines are considered to be "support facilities" not integral to the production of hydropower.

Wildlife Concerns

The interrelationship between wildlife and humans in Baker County has been ongoing for over a hundred and fifty years. Hunting and fishing are significant economic drivers in our economy. They are also woven into the social fabric of our citizens and are a significant part of the culture and custom of Baker County. Our challenge as a County is to preserve and enhance our wildlife resources while maintaining historic and contemporary uses of these resources. Our objectives are to involve local stakeholders in the development of wildlife plans, including for ESA species; to encourage the maintenance and improvement of wildlife habitat on public lands; and to identify acceptable habitat where ESA species can be conserved without substantial conflict to other natural resource users. Any proposed management plan of a listed species will require coordination with the County to ensure that it is consistent with the Natural Resources Plan.

I. Focus on Wildlife Populations is Inappropriate

Wildlife management is the prerogative of the State of Oregon. The DEIS not only proposes to manage wildlife to the degree that usurps the State's jurisdiction; it violates its multiple-use mandate in prioritizing wildlife "protection" over all other uses.

We agree with language on p. 29 of the RLMP, which states that NFMA "requires land and resource management plans to contribute to the diversity of plant and animal communities, based on the suitability and capability of the land area, while meeting overall multiple-use objectives" (emphasis added). We disagree with the statement that "a species-specific approach is warranted" in cases where "ecosystem diversity does not provide the ecological conditions necessary to sustain populations of certain species." This is in direct conflict with the previous statement regarding NFMA requirements. Single-species management is not a wise—or legal—approach to national forest management. Focusing on habitat diversity, rather than focusing on species' populations, provides for a more workable management approach and allows USFS to address those issues over which it has the ability and authority to control.

The states have primary jurisdiction over non-ESA protected wildlife and therefore should be the entity that manages wildlife. Coordination with the states through Memoranda of Understanding (MOUs) should be the primary tool used for coordinating wildlife management with local land managers and stakeholders.

II. Species "Viability" Language Is Inappropriate

The Plan incorrectly includes language that requires USFS to "maintain a viable population of each species of conservation concern" (RLMP p. 113). (Also see Vol 2 p.30 – "Species Viability –

Overview"). Nowhere in statute is this "viability" requirement mandated; wildlife management is, again, the responsibility of the states.

In the case of bighorn sheep management (noted in detail in the grazing section), USFS has taken to the extreme the species-viability "mandate" that it has self imposed, threatening the domestic sheep industry due to its sole focus on preserving bighorn sheep. If this zero-tolerance "viability" policy were to be applied to other species, productive multiple uses such as logging, mining and grazing could potentially be curtailed altogether.

The broad definition of "species of conservation concern" allows for an indefinite number of species to be considered "of concern" by USFS. The definition of "species of concern" (Vol 3, p. 54) includes any species that has been petitioned for listing under the ESA. Any species, regardless of its actual population status, can be petitioned for listing; thus this category could be exceedingly large.

The 2008 Planning Rule (while not adopted) correctly recognized that "NFMA does not mandate viability of species." See 73 Fed. Reg. at 21472; see also id. at 21494. Rather, "species diversity appropriate to the area covered by a plan is NFMA's goal." Id. at 21472. These findings should be presented in the Plan. Further, the 2008 Planning Rule acknowledged that "viability would place an impractical burden on the [Forest Service]." Id. Maintaining species viability was determined to be a technical impossibility because the cause of decline of some species is outside the Forest Service's control. Id.; see also id. at 21496. Further, maintaining species viability for all species was determined to be impractical because of the large number of species present on units of the NFS. Id. at 21472. The Forest Service determined that focus on viability diverted attention and resources away from an ecosystem approach to land management that, in the Forest Service's view, "is the most efficient and effective way to manage for the broadest range of species with the limited resources available for the task." Id. The viability provision is dangerous, ineffective, violates states' rights, and should be removed from the Plan.

III. "Protections" of "Species Of Concern" Are Misplaced, and Category Is Too Broad

The DEIS describes the "protections" USFS proposes for numerous categories of species beyond just ESA species. This is beyond USFS' authority and creates a scenario where any species could be considered as "of concern." Meanwhile, most of the "protections" proposed by USFS serve to restrict other uses, including management activities such as timber harvesting and livestock grazing. This not only harms our economy and detracts from our citizens' social well-being, it threatens the

The RLMP states as a desired condition: "The natural range of habitats for native and desired nonnative fish, wildlife, and native plant species, including threatened and endangered species, species identified as regional forester's sensitive species, and focal species, is of adequate quality, distribution, and abundance to contribute to maintaining native and desired nonnative species diversity…Management activities improve the conservation status of species identified as being focal species or of local or regional conservation concern" (emphasis added) (RLMP p. 30). Not only are there too many categories of "species of concern," but the for qualification in these categories is exceedingly low, as described below.

1. *Focal Species Similar to Discredited "Management Indicator Species" Concept*

The USFS' use of "focal species" is inappropriate as it very closely resembles the discredited Management Indicator Species (MIS) concept. The theory of monitoring focal species to provide insight into the integrity of ecological systems and the status of other species has been discredited. The Forest Service has admitted that "[t]he theory of MIS has been discredited since the 1982 rule." See 76 Fed. Reg. at 8499 Supporting that admission, the Forest Service states:

[e]ssentially, monitoring the population trend of one species should not be extrapolated to form conclusions regarding the status and trends of other species. In addition, population trends for most species are extremely difficult to determine within the 15-year life of a plan, as it may take decades to establish accurate trend data, and data may be needed for a broader area than an individual national forest or grassland. Id.

Because the theory of monitoring focal species has been discredited and does not provide reliable information on the integrity of ecological systems and the status of other species, the theory should not be employed as part of the Plan. Rather than concentrating on species populations, especially those of focal species, the Plan should concentrate on habitat diversity, which is more consistent with USFS' requirement to provide for "diversity of plant and animal communities." 16 U.S.C. § 1604(g)(3)(B).

Note the similarities of its definition to MIS definition: *Focal species (Vol 3 p. 23):* A group of species that serve as an umbrella function in terms of encompassing habitats needs for other species, are sensitive to the changes likely to occur in the area, or otherwise serve as an indicator of ecological sustainability (Lambeck et al. 1997, Noss et al. 2007 and Andelman et al. 2001). *Management Indicator Species (Vol 3 p. 31):* In the original forest plans, a species selected because its welfare is presumed to be an indicator or other species using the same habitat. A species whose condition can be used to assess the impacts of management actions on a particular area.

2. "*Sensitive Species" Category Is Overly Broad*

Throughout the document, protections for "sensitive species" are proposed. The category is far too broad and at the sole discretion of the regional forester, leaving too much room for arbitrary "listings" of species. The glossary (Vol 3 p. 51) defines "Sensitive species" as: "Plant or animal species identified by a regional forester for which population viability is a concern either: 1) because of significant current or predicted downwards trends in population numbers or density; or 2) because of significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution. Those species that have appeared in the Federal Register as proposed for classification or are under consideration for official listing as endangered or threatened species, that are on an official state list, or that are recognized by the regional forest as needing special management to prevent placement on federal or state lists."

Thus, a species could be listed as "sensitive" at the sole discretion of the regional forester based on subjective "predicted" trends in population or habitat. By this definition, any species could be listed. The "sensitive species" category should be eliminated, and the focus should instead be placed on fostering resilient habitats.

3. *Threatened and Endangered Species Protected by ESA Consultation*

The DEIS focuses considerable attention on treatment of ESA species and is overly prescriptive for a programmatic document. The DEIS should instead include broad statements that projects within the planning area will comply with ESA requirements. ESA Section 7 consultation is required for every federal action; therefore every project within the planning area will necessarily be analyzed for ESA compliance.

IV. Wildlife Corridors Inappropriate

The inclusion of "wildlife corridors" exemplifies the DEIS' implication that multiple uses by humans are in conflict with the preservation of wildlife habitat. The DEIS states "Areas where most types of active management are generally not suitable will provide varying amounts of wildlife habitat connectivity" (Vol. 1 p. 15). We can assure you that lack of active management does not necessarily coincide with wildlife habitat. Quite the opposite, in fact: wildlife are abundant on our private and state forests that are well-managed. Our county's long heritage of

hunting and fishing, logging, mining and grazing alongside wildlife is indication enough that "wildlife corridors" are unnecessary.

The Forest Service states their desire for management strategies to increase the adaptive capacity of terrestrial ecosystems in the face of climate change. Enhancing landscape connectivity is one method that is mentioned. The document states that by closing roads in the corridors, the adaptive capacity of terrestrial ecosystems will be enhanced. Animals currently move from one part of the North Fork John Day Wilderness to the next without problems. There is no justification for the corridors to connect the two parts of the wilderness. In fact, court cases since the Wilderness Act was passed have decided, without exception, that there can be no buffers around the wilderness areas.

V. Management Restrictions Will Harm Species and Multiple Uses

1. Effects of Reducing Logging

Reducing logging via the proposed standards and guidelines below will only worsen the wildfire threat to wildlife and reduce forage opportunities due to canopy cover and overcrowding.

2. Effects of Reducing Grazing

Ranching on both public and private land "has been found to support biodiversity that is of conservation concern" (Knight, 2007). In the West, where productive, private lands are interspersed with large areas of arid, less desirable public lands, biodiversity of species depends greatly on ranchland. According to Rick Knight, a biology professor at Colorado State University, ranching on both public and private land "has been found to support biodiversity that is of conservation concern" because it "encompasses large amounts of land with low human densities, and because it alters native vegetation in modest ways." [12] Knight also noted that other uses – such as outdoor recreation and residential use – are not as conducive to the support of threatened or endangered species. Areas with flourishing and diverse plant and wildlife populations are often found in their present state because of, and not despite, the practice of grazing (NRCS, 2004). Wild birds, animals and rodents seek out and thrive in the shelter provided by natural ranch features, like diverse plant cover and windbreaks, as opposed to row-to-row crops or bare landscapes. Large animals such as elk and deer are known to thrive in areas where cattle graze.[13] Grazing improves wildlife habitat by increasing the quality and accessibility of grasses and forbs (Neel 1980, Derner et al.1994, Evans 1996). See more benefits of grazing in the "Grazing Concerns" section of these comments.

VII. Monitoring Timeframe Is Unrealistic

Page 113 of the RLMP (Table 29, 3) states "Status of select set of the ecological conditions required under §219.9 to contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern." The "Proposed Monitoring Question" is, "What is the condition and trend in habitats for aquatic focal species (steelhead, spring Chinook salmon, bull trout, and redband trout)?" The timeframes given are Annual, 5 year.

Comment: These timelines are inappropriate. Monitoring protocols need to be understood by the authors. Trend cannot be determined on an annual or even 5-year basis.

[12] "Ranchers as a Keystone Species in a West that Works." Richard L. Knight. Rangelands Oct. 2007.
[13] Texas A&M University-Kingsville (2005). *Cattle Management to Enhance Wildlife Habitat in South Texas*. Wildlife Management Bulletin of the Caesar Kleberg Wildlife Research Institute, Management Bulletin No. 6, 2005.

Access Concerns

Importance of Access to Baker County

All roads in the forest were built for a purpose and those purposes still exist. The roads represent a very significant investment as well as a necessary route for commerce. Roads also serve as a necessary firebreak and a means for rapid response to fires before they become conflagrations. Roads are crucial to the health and safety of our citizens. The roads provide much needed access for mining and private land forest management interests such as water and grazing rights and access to lands that have ties to public lands.

The forest lands must be managed with timber and thinning activities and the only way this can be done is with the use of our current (and possibly enhanced) roads systems. These roads give us the opportunity for jobs in Baker County. Keeping access open for the timber, mining and grazing industries will keep our towns and county economically sound for generations to come.

Additionally, our County's landscape is a recreational haven for residents and visitors alike. Families who live in Baker County, often times for generations, perceive recreation as a "right to enjoy" the surroundings of home. In a nutshell, *"it's why we live here."* Recreation is also the a critical economic drawing point for the County, attracting visitors who come to view wildlife, fish, hunt, ski, snowmobile, hike, camp and generally enjoy the beauty of Baker County. Tourism is one of the largest economic drivers in Baker County- in fact, only agriculture generates more dollars for this County. Direct travel spending is estimated to be over $45 million per year, per Dean Runyan Associates for 2006. Tourism accounts for approximately 630 jobs throughout the County.

For these reasons, the road system needs to remain intact. If an environmental reason exists for modifying a road, local input needs to be obtained and a mutually beneficial solution coordinated.

County's Access Requirements

Road closures on and affecting access to public lands in Baker County require an appropriate County and public review processes, noticing, appeal periods, and a genuine good faith effort to incorporate the suggestions and concerns put forth by the public. In order to protect Baker County citizens' rights and recreational interests and access to and on public lands, road closure proposals on public lands within Baker County, as well as the creation of Wilderness or Wilderness Study Areas that would be managed as wilderness areas, National Monuments, "Wild and Scenic", or any other labels that would no longer allow unrestricted use of public lands within Baker County, shall be coordinated with Baker County and the provisions and goals set forth in this Natural Resources Plan.

We have a goal of minimizing actions that diminish the quantity or quality of outdoor recreational experiences available to visitors. Enhancing trail systems for OHV use is part of that goal. Also, ensuring adequate access for those with limited mobility is important, as these individuals constitute a large segment of both the tourist and local populations in Baker County.

USFS Has Misled Baker County Residents

Baker County residents have been told at every meeting that the EIS does not close roads. Page 63 states, "While the Forest Plan would not change designations of roads and trails for motor vehicle use, it would provide direction for future planning". Page 63 states, "*The number of acres suitable for motor vehicle use and the desired future condition for road density is those areas will influence the future transportation system*". Page 63 states, "*An area determined to be unsuitable for motor vehicle use is expected to have no future road or motor vehicle trail construction*".

This need not be the case. Page v11" states that the "Desired conditions are broad and may only be achievable over long periods of time". Baker County agrees with this approach. We believe that with proper Forest management, coordinated with Baker County and the County Resource

Management Plan, access and recreation opportunities can be improved, access for the citizens can be maintained and rural communities can survive and even grow.

DEIS Downplays Socio-Economic Importance of Access

In Volume 1 Introduction, the document begins by stating the intent of the EIS. Last on the scale of importance, is recognizing the interdependency of social and economic components. The Forest Plan should protect our custom and culture, which is strongly based in access and use of the National Forests, in the same manner it protects the environment. Access and recreation on National Forest system lands is critically important to the citizens of Baker County and the surrounding areas. Activities such as camping, hunting, fishing, wood cutting, gathering of mushrooms and berries are not possible without roaded access.

Page 181 Goal 1: Promote Ecological Integrity "*This goal and the desired conditions are interrelated with the social and economic components of sustainability*". Designating areas unsuitable for access, since this will greatly diminish the economic component of sustainability of the recreation activities within the National Forest. The "good will" the Forest is striving for will not happen.

Goal 2 talks about "....natural resources related work, including ... recreation". Most of the recreational activities that take place on the National Forest involve the local citizens. It is mostly during hunting season that people come to the forest from other areas. Our citizens are not wealthy, they do not vacation in the Bahamas, rather they use the national forests. Page 85 states, there is a "potential for FS actions to disproportionately affect minority and low-income populations (Executive Order 12898)". Closing roaded access to the National Forest will cause this effect. Motorized access is vital to the use of the forests.

DEIS Proposes Actions That Require Site-Specific Analysis

Because the USFS strongly suggests in several places throughout the Proposed Plan and DEIS that it intends to take certain action under the Plan, it should include additional site-specific evaluations of the environmental impacts of these plans or move those actions.

For example, one of the objectives listed in the Proposed Plan would require that "[w]here open motor vehicle route density exceeds desired conditions, implement route closures and/or decommissioning or consider designating routes for other uses." Proposed Plan at 107. The Forest Plan also establishes as one of its guidelines (OF-2) that "[n]ew motor vehicle routes should not be constructed within old forest stands." Proposed Plan at 129.

Statements in the DEIS often include a great deal of specificity regarding what actions would be undertaken by the USFS if the Proposed Plan is implemented. For example, implementation of Alternative E would involve "replacing undersized culverts, out-sloping roads, hardening surfaces to reduce erosion, occasionally relocating or decommissioning roads to address the roads with a focus on watersheds with threatened and/or endangered aquatic fish species." DEIS Vol. 1 at 37.

Additionally, the USFS states that, with the exception of the no-action alternative, "[a]ll alternatives . . . propose management direction that would result in the closure or decommissioning of open motor vehicle routes in order to meet desired conditions." *Id.* at 80.

The Proposed Plan goes too far in its plans to close roads within the Blue Mountains Forest. It should do no more than lay out the desired conditions and identify issues of concern and a number of possible ways to mitigate those concerns.

"Preferred" Alternative Limits Access

Baker County is opposed to Alternative E management areas featuring backcountry non-motorized (228,100 acres) and additional motorized (425,200 acres) and connective wildlife corridors (28,100), along with additional wilderness proposals.

Volume 1 Chapter I, on page 8, states that one of the Decision Criteria is "*Minimizing conflicts between revised forest plans and travel management decision and contributing to economic and social needs of people, cultures and communities"*. However, it does not appear that the EIS accomplishes this. Page 10, under Issues-Access states, "*It will provide direction for future planning or motor vehicle routes and areas. The forest plan designates areas where the dominant uses are non-motorized"*. Baker County reminds the Forest Service that wilderness areas, such as Monument Rock, are rarely used. More non-motorized areas are not needed.

Page iii Issue 6, states, "*Public concern is heightened because the management to approach ecological resilience will determine the ecosystem services the Blue Mountains national forests provide*". The public in Baker County really is concerned. The "*management to approach ecological resilience*" we see in the Blue Mountain Revision means a blueprint for a future Forest with less access, more wilderness, more wildlife corridors and non-motorized areas, wider "riparian" buffers on ephemeral streams.

Wildlife Corridors Are Restrictive and Unnecessary

Page 15 under Wildlife Habitat Connectivity, states, "*Alternatives E and F also have minor acreages identified for management connections of wildlife habitat*". Baker County does not consider 28,100 acres as a "minor acreage". Page 222 MA3C (wildlife corridors) states that both summer and winter vehicle use is restricted to designated routes. Baker County does not agree that these corridors are necessary. Page 305 states, "*the population of Rocky Mountain elk is expected to remain stable during the life of the plan for any of the alternatives"*. Elk are an indicator species. With or without corridors, wildlife will be unaffected.

On page 37, the document also talks about the corridors. Under Issues: Alternative E *"designates a small amount of wildlife corridor (MA 3C) linking high quality unroaded wildlife habitats which would allow the "suitable use" of motor vehicle use in summer and winter on designated routes"*. The document does not define "*suitable use*", which is a concern. The corridor between the two portions of the North Fork John Day Wilderness is not necessary. The roads in this area are used by miners, local residents looking for wood or recreating on the forest. Animals can move from one portion of the existing wilderness to the other, without giving them their own corridor. This corridor idea is without merit. The animals have riparian areas for use as movement corridors. Page 231 Chart shows 362,500 acres locked up in the riparian stream buffers. Page 12 states, *"riparian and aquatic habitat conditions are currently trending upward at the scale of the plan area following 15 plus-years of management under the 1990 Forest Plan"*.

Volume 1 Chapter 3 on page 59 begins an extensive discussion of roads and access. The EIS indicates that the Forest Service wants management strategies that will increase the adaptive capacity of terrestrial ecosystems in the face of climate change. Enhancing landscape connectivity is one method that is mentioned. The document states that by closing roads in the corridors, the adaptive capacity of terrestrial ecosystems will be enhanced. Restricting access to 1 mile of road per section, is proposed for these areas. The corridors are not needed by wildlife, and corridors represent just one more buffer around the wilderness, which court cases have consistently affirmed is not legal under the Wilderness Act. Alternative E management areas feature, in addition to connective wildlife corridors, backcountry non-motorized (228,100 acres) additional motorized (425,200 acres) and additional wilderness proposals.

RS2477 Roads

Baker County is asserting the County's right to roads granted to the counties under RS2477. Page 15 under RS2477 states, "*This includes rights of way under RS2477 that have been adjudicated through the Federal Court system or otherwise formally established"*. The EIS states that the only means of obtaining the existence is through a judgment under Quiet Title, however the law does

not require this action. Once the County asserts its right to a road under RS2477, no further action is needed, unless the Forest Service wishes to pursue other actions.

Hydrologically Connected Roads

Volume 1 Chapter 2 on page 36, under Alternative E, states that the desired condition is to reduce hydrologic connectivity as opposed to using road density, so that roads contributing the most sediment to the aquatic and riparian system will be addressed, (focusing on ESA streams). At first look, this approach appears to have merit. However, further in the document it is disclosed that the term "*hydrologically connected*" means road segments within 300 feet of a waterway. "*Research has shown that effective vegetated filter strips need to be at least 200 to 300 feet wide to effectively capture sediment mobilized by overland flow from outside the riparian management area"*. (Rieman et al, 2001) This study took into account geology and slope, which is not discussed in the EIS.

There is nothing magic about 300 feet; Page 264 states, "*Effects of roads to watersheds function can be reduced by considering location, design, and management to disperse road runoff (Furniss et al 1991).* Also, page 264 states, "*Haupt and Kidd (1995) suggested that 30-foot wide riparian buffers were sufficient to prevent road related sediment delivery to streams*". In contrast Ketcheson and Megahan (1996) suggested that 330 feet buffers may be insufficient to prevent sediment delivery to streams depending on the geology (extreme cases such as steep slopes, soil composition and lack of vegetation).

The answer lies in between these two studies. Determination of where roads are hydrologically connected should be made on a case by case basis, instead of what is described on page 264, "*Riparian roads, as used in this analysis, are approximated by miles of road within 300 feet of any stream channel*". Page 264 clearly states that sediment input into water ways is dependent upon topography and the natural conditions of the site. Rarely, if ever, would a road 200-300 feet from a waterway cause adverse impacts on water quality.

"*Any stream channel*", means even an ephemeral channel. Page 306 Roads, states, "*There are 10,600 miles of existing roads and an average road density of 3.2 miles per sq mile An estimated **4,226 miles** of hydrologically connected roads occur",* and these will be proposed for closing under the EIS.. Page 8 states, "*The FS has a long history of science-based decision making"*. The 300 foot criteria for hydrologically connected roads is not based on science.

Page 314 states, "*Road decommissioning would have a similar positive effect ...with two main differences (1) existing studies appear to consistently show that a high % of road-related sediment is produced by a relatively small % of the road network... and it has been shown that road decommissioning will not have as much influence on improving watershed condition as would focusing on the roads that have the greatest effect"*. Page 315 states, "*Road decommissioning is more expensive, per mile, than treating hydrologically connected roads, with a cost factor that may be as high as 10 or more, making it likely that an emphasis on road decommissioning would result in a slower rate of improvement*". Again, Alternative E should not take a blanket approach to close all roads within 300 feet of waterways. Instead, roads should be evaluated on a site specific basis and those roads causing problems should be treated so they no longer are a risk to water quality.

Page 37 states that open road density would change from a standard/guideline to a desired condition, which is good, because the document states that desired future conditions will be achieved over the long term. However, the document is confusing, in that on page 36, Volume I Chapter 1, the document states that instead of using road density, the Forest Service will use hydrological connectivity to decide which roads to close in general habitat. Page 37 states, "*Alternative E takes a different approach by moving away from road densities in general forest (MA4A) and instead focusing on the roads that are causing the biggest problems"*. The problem is, the Forest Service is proposing under Alternative E to not only close all the roads within 300 feet

of waterways, but will also close good rocked high and dry roads to reach specified road densities in specific areas. Page 243 "Approximately 80 percent of road-related sediment is coming form approximately 20 percent of the roads". It is clearly evident that only a small percentage of roads cause most of the damage. Improving these few roads will solve the problem of road related sediment into into waterway, without closing hundreds of miles of road.

Road Density Should Be Flexible

Page 80 states, "*Proposed open route densities for all alternatives are meant to be an upper limit. It is not the intent to increase open road densities to that upper limit...rather in area that currently have open road densities above the level proposed by desired conditions, it is expected that open routes would be closed..*" Baker County recommends flexibility here. Areas with higher than desired road densities located adjacent to areas such as wilderness or roaded back country, should be cut some slack. Wildlife can use the areas adjacent to the areas with higher road densities if they are looking for solitude.

County Opposes Backcountry Designation

Baker County is opposed to the designation of non-motorized backcountry. Page 198 states, "*Non-wilderness uses adjacent to wilderness may have a negative effect on the quality of wilderness recreation experience*", and the Forest Service intends to restrict uses adjacent to the Wilderness that might impact a person's "wilderness experience". Court cases over the years have determined that the Forest Service may not establish buffers around the wilderness areas, however, that is exactly what they are trying to do.

This is nothing more than designating wilderness without going to Congress. These nonmotorized backcountry areas are more buffers around the existing wildernesses, and this is not legal. Non-motorized back country should be eliminated from Alternative E.

On page 3, the document states that "Both summer and winter vehicle use would be considered unsuitable in non-motorize areas (MA3B"). While Baker County does not agree that any nonmotorized backcountry is needed, this explanation in the document is flawed. The text should read 3A, not 3B.

Page 37 states that open road density in MA 3C (motorized backcountry) would be no greater than 1 mile/section. The Forest Service knows this is an impossible desired condition. It takes more than a mile of road to cross one section, due to topography. The existing motorized backcountry areas should not have further road closures. Page 221 describes MA3A (backcountry motorized) access stating it "*may be restricted seasonally, by route designation or by area restrictions"*. This is a change from the 1990 Forest Plan where there were no restrictions on road use in back country. There are opportunities for recreation, wood cutting and resource development in these areas, but if there can only be one mile of road, it will be difficult, if not impossible to do much of anything.

Page75 discusses that "*cross-country motor vehicle travel is unsuitable in any area in any alternative"* (this should read any action alternative). Also, this is not consistent with page 81, Alternative E which designates one existing off-road vehicle area as open to cross country motorized travel.

Elk Habitat Does Not Require Low Road Density

Page 37 states that open road density would be no greater than 1.5 miles/section in winter elk habitat. Baker County is opposed to this low density, because it simply is not needed. Winter elk habitat is snowed in during the winter months when elk are vulnerable, and vehicles do not bother them. The other part of this equation, is that the elk do not even use a lot of designated habitat. They come down to the haystacks or winter at the elk feeding stations along the Elkhorns (their populations are flourishing, it should be added). Each time the Blue Mountain Plan is revised, more

areas are designated as closed to motorized vehicles. Baker County envisions that next go-round, elk winter range will be designated as some sort of non-motorized area.

Road Decommissioning More Expensive than Maintenance

Page 48 Alternative A indicates 444 miles of road are currently maintained. Under Alternative E, only 359 miles of road will be maintained due to budget shortfalls projected to be about $200,000. Page 63 "cost of maintaining the transportation system and the desire to reduce motor vehicle route density (and therefore access). Page 68 states, "*The cost of road maintenance and the budget trend make it likely that future road closures will be necessary*". Page 80 states, "*If maintenance funding decreases, roads determined to be unsafe and of low priority for maintenance would likely have to be closed"*. Baker County wonders where the money would come from to close all these roads if budgets were cut. It would appear that the money might be better spent maintaining roads for the public to use. Page 276 states, "*Alternative E includes desired conditions for road density in watersheds with anadromous fish and bull trout*". This is nonsense. As long as roads are not adversely affecting water quality, the number of road in a watershed is irrelevant.

Closing Roads Will Increase Impacts on Remaining Roads

Page 68 states, "*Much of the deferred maintenance will fall on maintenance level 1 and 2 roads, which represent 93% of the road network"...Wildlife soil water quality and spread of noxious weeds are negatively affected by the degree and public use of the transportation system"*. Page 263 states, "*erosion has been found to increase with the amount of traffic* (Reid and Dunne 1984. These are very interesting statements in the EIS. The complaint is that a lot of traffic on a few roads is bad for the environment, however, the entire EIS is focused on closing roads, which forces everyone to travel on the same few roads. This really makes little sense.

Reclassifying Roads to Justify Unnecessary Closure

Page 73 states, "*It is assumed that open motor vehicle route density desired conditions would be met by reclassifying maintenance level 2 roads to maintenance level 1 (custodial care) roads through individual project planning*". This is a very sneaky approach. By reclassifying good rocked roads as maintenance level 1, these roads are closed by definition. Page 67 states, *"It is important to understand that some roads require annual maintenance while other roads, due to stability of the roadbed, are rarely maintained"*. Reclassifying and closing perfectly good roads that are used by the public is not the answer. There is no science behind this strategy and it hurts the people of Baker County.

Additional Trail Systems Needed

Page 65 states, "*The Blue Mountain national forests trail system has remained relatively the same for the past 20 years"* . Page 66 states that currently, *"There are relatively limited opportunities for motor vehicle use on system trails"*. It seems that there is a need for additional trail systems and this direction should be a part of Alternative E.

Winter Travel Excessively Regulated

Page 78 states, "*There would be no desired conditions standards or guidelines for over the snow travel. This will be determined by site specific project decisions"*. However, the EIS does have direction for winter recreation. Page 259 WLD-HAB-13 G16 "Motor vehicle use within elk winter range should not be authorized or allowed between Dec1 and April 30". Page 202 Alternative E: Wildlife corridors (MA3C) will have all cross country snowmobile traffic prohibited. Page 199 Recreation states, "*Winter recreation, such as cross country skiing and snowmobiling, can stress wintering animals during deep snow periods*...." Page 199 states, "*Over the snow trails provide some animals with access to areas they usually cannot use during the winter*.."

Page 391 “winter recreation has significant tourism effects for the communities of the Blue Mountains”. Page 391states, *“Snowmobiling is a controversial topic. with parties interested in maintaining or expanding snowmobiling, and other parties seeking to restrict or eliminate it”*. In Baker County, snowmobiling is not controversial at all. The winters are long here, and snowmobiling is a fun and exciting winter activity. Areas such as Anthony Lakes provide sledding and skiing opportunities, leaving the trails available for snowmobiles. The Poker Runs bring in much needed revenue to businesses during the slow winter months.

BLM Roads Discussion Irrelevant

Under cumulative effects, on page 81, the EIS talks about the “*cumulative effect of reduced motor vehicle access on Bureau of Land Management lands*..” This is untrue. Most roads on public land were constructed before 1976, when FLMPA repealed RS2477. These are county roads and will not be closed. BLM has not produced a TMP restricting travel that Baker County is aware of.

Mining Rights Must Be Protected

Volume 2 Chapter 3 page 198 Road and Trails states, *“No new road construction is anticipated for any of the alternatives.* Mining access would be the exception, and this should be stated.

Conclusion

In conclusion, it is evident that as is stated on page 80, *“Implementation of all alternatives, would affect access over time. In every alternative, open motor vehicle route density would exceed desired conditions, which makes it likely that site-specific project level decisions would result in road closure or decommissioning as the FS attempts to achieve or move toward the desired condition”*.

Page 180, under Goals and Desired Conditions states, “*The goals and desired conditions for the action alternatives were developed collaboratively*”. Baker County cannot help but wonder who collaborated with the Forest Service on designating areas unsuitable for motorized travel. It certainly was the not the citizens of Baker County.

The blueprint for future access, revealed with the Blue Mountain Revision, is clear. Page 69, states there are currently 1,315,750 acres (75% of the Forest) which is suitable for motor vehicle use. Over the long term, the plan is to see all roads within 300 feet of streams closed, all high and dry roads that exceed the desired densities closed, leaving a few roads open for access, with accelerated resource impacts by funneling all vehicles onto a few roads.

Page 32 describes multiple use management as, *“The management philosophy articulated by the Multiple-Use Sustained Yield Act of 1960. This law provides that the renewable resources of the national forests are to be managed in the combination that best meets the needs of the American people. It further stipulates that the FS is to make judicious use of the land for some or all of these resources and related services over areas large enough to ensure that sufficient latitude exists to subsequently adjust management in conformity with changing needs and conditions”*. Page 81 states that “*people are a part of the ecosystem and are essential to the vitality and resiliency of the ecosystem. They are the stewards, producers, distributors and users whose actions and activities shape Forest Service policy and management*”.

If this is true, then Baker County proposes that Alternative E be modified to accommodate the people who use the National Forests. Let our citizens’ needs shape Forest Service policy and management. Let there be a balance between protection of the resources and the needs of the people. Page 387 states, “*Where motor vehicle use is deemed suitable, it is because that recreation activity does not interfere with the purpose for which the area was designated*”. Thus, designations of new wilderness, non-motorized back country, and wildlife corridors should not be included in Alternative E. If not designated, then these areas will again be deemed suitable for motorized access.

Timber Concerns

Importance of Timber to County

Agriculture and forest production are the predominant land uses in Baker County. According to Baker County Assessor's records, there are approximately 146,386 irrigated acres and 1,129,662 non-irrigated acres that are, or could be, used for agricultural production. Of those acres, 377 irrigated acres and 399,097 non-irrigated acres are on public land.[14] There are an additional 673,681 acres of timber, 628,681 acres of which are on public land.

Forest products have historically been a mainstay of Baker County's economy, and they continue to play an important but changing role. The value of timber sales in the County fluctuates from year to year with the market, and the role that forest products play and the type of forest products sold have changed over the past 25 years in Baker County, as is the case across the Pacific Northwest. Between 1986-2008, timber harvest peaked at a high of 97,197,000 board feet in 1988, and had a low of 11,726,000 board feet in 2007. Baker County is similar to the statewide trend, where the majority of timber harvested is now coming from private land, whereas in the past the vast majority used to be from public land. The change is shown in the difference between peak harvest at 83,803,000 board feet in 1987, and the smallest harvest in 2005 of 213,600 board feet.

As the railroad made transport possible, Baker County's first sawmill opened in 1889. As major changes swept the industry, Baker County's last lumber mill closed in 1996, but there are still several wood products mills in operation.

County's Timber Management Requirements

Sound science and common sense support the premise of active forest management on the public forested lands in Baker County. Forest management practices on public land shall include a stable timber-harvesting program which is essential to maintain healthy forest ecosystems and to provide employment and economic security to individuals and businesses in Baker County. Investment in equipment and technology cannot be made without a stable program.

A management policy of no action or arms-length management is unacceptable, irresponsible, and potentially disastrous. What is needed is a cooperative, hands-on, proactive approach to forest management that uses timber harvesting as a tool to accomplish overall forest health and to ensure a healthy and vibrant forest for current and future generations.

Forest management shall follow the mandates of the 1897 Organic Act and adhere to the Multiple-Use/Sustained Yield Act of 1960 as well as the later acts: National Forest Management Act; National Environmental Policy Act; and the Endangered Species Act.

The BC Natural Resource Plan requires that Federal non-wilderness timberlands be managed for sustained timber production to promote forest health and to protect and maintain sustained economic returns. It also requires coordination with Baker County so that, when forest-fire and pest-caused tree stand mortality occurs, trees may be harvested before additional loss of economic value occurs.

Status of Timber's Economic Contributions

Timber harvest is very important to the residents of Baker County and to the economy of this area. Page 17 of the glossary defines economic well being as "A condition that enables people to work, provide income for their families, and generates economic wealth to local communities, the region and the nation". Because of USFS' treatment of forest management, such is not the case now. The

Forest Plan should protect our custom and culture and our livelihoods in the same manner it claims to "protect" the environment.

USFS does not recognize its role in the diminished socio-economic health of our County due to severe reductions in timber harvesting and resulting mill closures, and other social and economic losses. We agree with the DEIS' statement that "With historically high unemployment rates and many small communities poorly positioned to attract new industries providing family wage jobs, logging and wood processing jobs are essential to maintaining and improving social and economic conditions" (Vol 1 p. 5). We wish the DEIS reflected that reality by encouraging a real timber industry.

The DEIS downplays the effects that logging reductions have had on the County. Vol 1 p. 111 states, "Many people in the timber industry are adapting their skills and infrastructure to support a restoration-based economy." This is a misstatement. A few logging companies have bid on these stewardship projects, but it cannot be said that many people have done this. It is difficult to comply with all the requirements, and usually the projects are broken into small uneconomical units so everyone gets a little piece of the action. This is not a real job by any means.

Volume 1, page ii, Issue 2, under the heading, Economic and Social state, "one concern is the issue of maintaining the infrastructure in local communities (e.g. mills, roads, equipment, and skilled labor force). For Baker County, this statement is a joke. All our mills have been closed, our Forest roads have been closed, clearly evident in areas such as Bald Angel and South Fork watershed, and our communities are struggling.

Vol. Page ix, "Goal 2 states, National forests contribute to community resilience by providing jobs, ecosystem services, scenery, and recreational opportunities". Goal 2 appears to be mere platitudes, these word sound good, but have nothing to do with reality. The town of Unity is a good example. This town is surrounded by National Forest system lands. There used to be a saw mill, a shake mill and a pole mill. Now there are no mills, and there are no timber sales. Today, there are no jobs on the National Forest. The Ranger Station has long been closed. Nowhere do we see in the Blue Mountain Revision a statement admitting this past mismanagement of the Forest. This is an important disclosure for this document.

According to Boise Cascade Company, none of the alternatives in the DEIS will fully meet the needs of the local communities. The preferred alternative will slightly increase the outputs of the local national forests, but it will not allow the local mills to function at capacity. Boise Cascade will still be importing wood from outside of our region in order to maintain their current capacity (where only their plywood mill is functioning at 100% capacity, and the others are functioning at 73% and below). According to Boise Cascade, securing a sustainable supply of wood from the local forests that would actually meet their needs (about 100 million board feet from each forest) would allow them to add an additional 100-150 jobs to our mills in Umatilla and Union County. This is of importance to Baker County, as would be the logging and related jobs provided by increased timber production. Mills could reenter Baker County if our forests were properly managed.

Vol. I Page ix, Goal 2 talks about "....natural resources related work, including restoration, ranching and recreation". The importance of the timber industry should be added. Timber production is not done for "restoration's" sake alone.

Status of Timberland in Planning Area

Over-mature, overstocked, stagnant conifer forests cover much of the public land in the County. Within the WWNF are many stands of over-mature and stagnant trees that are stressed and subject to insects, disease and fire. Varying tree stands may have a different rotation age, stocking density, species diversity, access availability, or environmental and economic viability. However, all public lands provide products that may be suitable for harvest.

The RLMP recognizes the overstocked nature of the forest: "Based on forest inventory and the forest vegetation simulator fire/fuels modeling, 40 to 60 percent of the dry upland forest now has the potential for high severity fire as a result of the abundance of multi-storied stands with high stocking levels." (RLMP, p. 34). "Recent plan modeling of the potential mortality from disturbances from insects and disease indicates that approximately 30 percent of the forest stands in the Blue Mountains have the potential to have more than 25 percent of their total volume killed in the next 10 years." (RLMP, p. 35)

All Alternatives Fail to Make Adequate Progress Toward Desired Conditions

None of the alternatives offers a sufficiently aggressive timber management program in order to meet desired conditions. Vol 2 Page 163 states, "None of the alternatives would achieve the desired conditions for stand densities at year 50. Under all of the alternatives, the percent of the landscape in open forest would remain above the desired condition range at year 50 due to mortality from wildfire, insects, and disease exceeding growth rates. With little active management occurring in the cold upland forest potential vegetation group under all of the alternatives which would alter structural stages, species composition, and stand densities mortality from insects, disease and wildfire would be expected to continue to result in stand-replacing events consistent with the historic disturbance regime.

Fails to Meet Productive Capacity Goals

(RLMP p. 32): "Gross growth was estimated to be 1.7 billion board feet per year. Mortality was estimated to be 774 million board feet per year. Net growth for eastern Oregon was estimated at 791 million board feet of timber. High net growth rates can contribute to problems with overstocking and increased fire hazard. The current removal rate for timber volume in the Blue Mountains is far less than net growth."

Comment: The Allowable Sale Quantity (ASQ) in alternative D (most aggressive presented) is 236 million board feet per year (Page169 RLMP). That removal rate is less than 30% of the net growth per year. Again, the pace and scale of restoration is in reverse. Long-term sustained yield is not being approached (Page170 – RLMP).

The ASQ presented for the preferred alternate (E) is less than 20% of the annual net growth. Increased pace and scale of restoration in reverse. Long-term sustained yield is not being approached (Page170 – RLMP)

Fails to Meet Scenic Stability Goals

(RLMP p. 51): "**Existing Condition:** In many areas the long-term stability of scenery resources is at risk of large scale impacts due to conditions exacerbated by past wildfire suppression and harvest practices. The resultant conditions of homogenous, overly dense forests of nonfire-resistant species heavily laden with fuels put scenery resources at risk from uncharacteristically large, stand-replacing wildfires and insects and disease disturbances."

Comment: To reduce the risk of losing long-term stability of scenery resources, a much more aggressive approach is needed than is shown in these alternatives or documents.

Fails to Meet Fire Condition Class Goals

This is exemplified by each alternative's projected failure to meet desired fire regime condition classes over time. The desired conditions are: for "landscapes that exhibit a moderate or high degree of departure (Condition Class II or III), the degree of departure is decreased to low or moderate (Condition Class I or II.) After 20 years, the best projected progress toward this desired condition is offered by Alternative D—and it only achieves 38 percent of the goal. Alternative E would make less than one-third of the progress desired, with all forests continuing as "moderately departed."

All forest lands should be managed similarly to wildland-urban interface lands: (RLMP p. 63): "Vegetation treatments within the wildland-urban interface areas are based on wildfire protection objectives, which may over-ride ecological desired conditions. Vegetative structure would result in fire intensity that allows for safe and effective suppression actions within wildland-urban interface areas. In general, vegetation density would be more open, with lighter fuel loadings, in comparison to areas outside wildland-urban interface. Fire risk within wildland- urban interface areas would be managed so as not to limit the ability to use fire for resource restoration in areas adjacent to wildland-urban interface areas."

Alt. E's Proposal to Use Prescribed Fire Will Be Unsuccessful

USFS states that Alt. E will have almost the same beneficial ecological effect as Alt. D--which proposes more acres of mechanically treated forests—due to the use of prescribed fire in Alt. E. Alt. E proposes to treat the same amount of acres as Alt. D, except half of those acres will be via prescribed fire instead of mechanical treatment. Currently, due to conditions, USFS has a surplus of acreage that is slated for prescribed fire treatment. Proposing to treat additional acres with prescribed fire will only exacerbate the backlog and lead to even less work getting done on the forest.

USFS Science is Outdated/Inaccurate

The discussion of lack of large trees on the Forest has never been substantiated scientificially.

A quick assessment of References cited (Volume 3, pp 63-147), provides a metric for assessing how current and relevant the science cited is in the proposed revisions to the Forest Plan. Of the approximately 1250 references cited only 17 were published in 2012 or 2013; 10% were published in the last five years; and 35% in the past 10 years. Nearly two-thirds of all citations are more than 10 years old. A substantial number of the publications cited were not from peer-reviewed publications; many are to government documents.

The science referenced appears to be outdated and does not provide the most current scholarly understanding and/or guidance to address the management needs in the Forest Plan. A specific example of the gap between current science is how the word "resilience" is used throughout the proposed revisions to the Forest Plan.

Resilience is defined on page 13 (but is not included in the Glossary) as:

*"… the ability of a social **or** ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organization, and the capacity to adapt to stress and change (FSM 2020 interim directive)."* (Emphasis added)

The Resilience Alliance (2010. Assessing resilience in social-ecological systems: Workbook for practitioners. Version 2.0) defines resilience as:

"The capacity of a system to absorb disturbances and reorganize while undergoing change so as to retain essentially the same function, structure, identity, and feedbacks."

The Alliance goes on to point out in the workbook that:

"Natural resource management issues are not just ecological or social issues, but have multiple integrated elements. These systems, in which cultural, political, social, economic, ecological, technological, and other components interact, are referred to as social-ecological systems. Social–ecological systems emphasize the 'humans-in-nature' perspective in which ecosystems are integrated with human society."

The Goals of the Forest Plan that are cited in the Summary (p ix) address "… cultural, political, social, economic, ecological, technological, and other components [that] interact …". Thus, in current resilience-thinking, the Plan should view the Blue Mountain Forests as **social-ecological**

systems, and provide adequate attention to the role societies across the Blue Mountains play in the management of these forests. Management without considering the whole integrated social-ecological system will simply not achieve the resilience that is sought.

To provide a means for examining the state of resilience within the social-ecological system, the IUCN Commission on Ecosystem Management Thematic Group on Resilience examines 11 attributes that play a role in fostering resilience in complex systems such as Forests (Basic Resilience Assessment: A Practitioners Guideline For Learning About Resilience…. In prep). Of the 11 attributes, seven link resilience to the forest management alternatives that are described in the Proposed Revisions and provide a basis to monitor the state of resilience in the forests:

- **Diversity** – maintaining diversity across the social and ecological components of the system, e.g., institutional engagements, governance, business models as well as species, habitats, and spacial distributions.
- **Ecological variability** – fostering different ecologies within an area, such as grasslands within and around forested areas.
- **Modularity** – maintaining a system of firebreaks; a patchwork of timber stands at different stages of maturity.
- **Tight Feedbacks** – this is reflected in an ability to monitor and act on changes in ecosystem health in a timely manner.
- **Social Capital** – In the context of the Forest Plan Revision, acknowledging the important role the forest Collaboratives play in the Umatilla, Malheur and Wallowa-Whitman National Forests in developing and implementing site-specific management actions, and promoting Coordination Agreements with County governments will contribute to increased resilience.
- **Innovation** – The Plan should express willingness to try new management ideas, experiments in adaptive management; consider means for fostering local knowledge and locally developed rules to be used for system management as an alternative to centralized command and control management. To create blends of traditional and modern management practice.
- **System reserves** – Setting aside "no harvest areas" provide sources of seeds for regeneration in managed areas and an ability to assess the impacts of different treatments on forest health/resilience.

The eight papers that address resilience that are cited were published between 1973 and 2007. Four citations deal with the theory behind resilience in social-ecological systems and the practice of management for resilience; four report on resilience in the context of studies about Redband Trout. None address resilience in the context of forest management.

Hindrances to Forest Management

"Unsuitable" Acres

USFS proposes to harvest less than 3% of acres "suitable" for timber production on all three forests (1.8% on WWNF.) Meanwhile, the plan states that "The potential for fires with uncharacteristically severe effects exist on approximately 60% of the three national forests." Plan does not treat enough acres to increase forest resiliency to wildfire. Under the most aggressive alternative (D), 52% of the WWNF is vulnerable to catastrophic wildfire.

Riparian Management Areas

Currently, riparian areas may be managed based on site-specific analysis. Logging may take place within 25 feet of streams. This DEIS offers no such flexibility. Furthermore, it proposes to

drastically increase riparian zones by changing the buffer to 100 feet on seasonally flowing streams and small wetlands, whether or not the streams are fish bearing.

Legacy Trees/ Old Forest

On page iii-iv (Vol 1), for Alternatives D-F, the document states there will no longer be designated old forest management areas. This is a good thing. Timber management activities should take place in these areas. However, the document describes a "legacy tree" as a live tree over 21 inches—then states in guideline OF-1 (Vol 3 p. 279) that these will be protected. That puts us back where we started. The definition of a legacy tree should be changed to include only trees over 21 inches dbh that are healthy, produce cones and are without disease or dead top.

Page 12 (Vol 1), under Old Forest, states that the Forest Service shall determine how much old forest the Blue Mountains national forests should have in the future. The EIS needs to explain just how the Forest Service will do this. If stands of timber that are ready for harvest can be subjectively eliminated from a sale, this is not acceptable. This definition must be based on science and must be consistent throughout the forest. Determination of old forest should involve county coordination.

Page 161 states, "*Within the WAW 32% of all upland forest potential vegetation groups (cold moist and dry) are currently in old forest structural stages.*" This is a huge percentage of our forests and would unnecessarily reduce timber harvests. Insects, disease, and fire will devastate these stands.

Page 256 (Vol 3) WLD-HAB-2 G-2 states "The extent of existing late old structure stands within the moist and cold old forest types that are 300 acres or larger should not be reduced or fragmented". Alternative E should include management of these timber stands.

Wildlife "Protections"

Volume 2 p. 267 states that "Trees with nest cavities and large snags are also provided protection." Other measures say after a fire, if you do log keep the snag classes. These restrictions are arbitrary, and could cause safety concerns for loggers.

WLD-HAB-19 G 4 states, "*Greater than 50% of post fire source habitat should be retained and should not be salvage logged, except in the urban interface*". This is a waste of timber. It will quickly rot and will fall, making the area unusable for wildlife.

WLD-HAB-20 G 5 states there will be no logging in areas less than 100 acres after a fire. There is no basis for this decision.

Threats to Access

Logging cannot happen without roads. (See Access Concerns)

Recommendations

Recognizing the importance of local timber-related businesses in Baker County, we strongly support management alternatives that increase supplies of wood products that will be predictable and available on a steady basis. Baker County has lost all commercial-scale sawmill and logging infrastructure, as have most communities in Northeast Oregon. This loss has had a negative effect on the net values of the forest products to private timberland owners as well as government timber. We therefore feel that the number-one goal of the Forest Plan should be to ensure that the existing forest industry infrastructure be maintained at least at current levels **and** provide incentives to foster development of new forest-related industry. Any further degradation of the industry will have a negative effect on the ability of the National Forest and the private timberland owners to conduct forest management.

Professional foresters in Baker County contend that when timberland owners lose value related to their forest lands, they lose interest in managing that land and in many occasions the best value of the land is to sell it into subdivided parcels. When this occurs we not only lose the ability to manage the forests but we also lose valuable wildlife habitat. Therefore, what happens on the national forest also affects the private forests.

from the areas to be managed, such as: proposed designated roadless areas, wilderness study areas, stream buffers, and wildlife corridors. As these designations effectively remove forest from management, they should be kept to a minimum and only designated with the County's approval. Professionalism in forest management is not limited to employees of the US Forest Service. Non-government foresters are aware of the best science to manage our forests in a manner that improves forest resilience and health, while providing a sustained flow of commercial forest products. It is essential if private landowners are to maintain and sustain the benefits they derive from their resource.

Mining Concerns

Importance of Mining to Baker County

Mining is an important resource in Baker County. According to the Northwest Mining Association, the State of Oregon is home to over 300 medium to large-scale mining operations. Approximately 20 operations in Baker County are large enough that they are administered by the Oregon Department of Geology and Mineral Industries (DOGAMI). Currently, there are over 1,200 mining claims filed in Baker County on USFS and Bureau of Land Management (BLM) managed lands, and these claims are owned by both local and out of area miners. In addition, there are many patented mining properties and other lands that are mineral in character where small-scale mining takes place.

Baker County is one of the most mineralized counties in Oregon. Mineral production has provided an important contribution to the economy of not only Baker County but also the State. All lands not lawfully withdrawn from mineral exploration and/or development must remain available for such use. The mining industry makes up an important part of the property tax base of Baker County and the payrolls and expenditures for equipment, materials and supplies are important to the economic stability of the county. Mining is one of the historical uses of the federally managed lands within Baker County and predates the establishment of the Forest Service and the Bureau of Land Management and maintenance of such use is statutorily compatible with multiple use principles.

Ashgrove Cement is Baker County's largest mining employer, employing 120 people. In addition, there are 10-20 medium scale mines, and an additional 20 large-scale mines, providing family wage jobs, and producing gold, rock, sand, gravel, building stone and perlite. Jobs in the Oregon mining industry are high paying- 21% higher than the average wage in the state. Mining creates new wealth, which expands when resources are processed and manufactured into useful products. Indirect jobs created by mining range between 3:1 and 6:1. In 2010, about 200 small-scale mines will be producing gold in Baker County. If each of the small mines only recovered ½ ounce of gold per day, that value of $100,000 per day would provide purchasing power for fuel, oil, tires, parts, equipment, labor and materials. The total business impact will be significant, if through coordination, Baker County is able to work with the USFS and BLM, and these agencies approve the 100 or more mining Plans of Operation that have been backlogged for so many years.

County's Requirements for Minerals Management

It is the policy of Baker County, Oregon that all exploration, development and mining on lands in the county with mineral or energy potential shall be governed by scrupulous adherence to all laws which pertain to mining and energy development and production, beginning with the Congressional Act of July 26, 1866.

We also require that the directions and policies of the Land Management Agencies do not interfere with citizens' rights of access, property and occupation while prospecting and developing mineral and energy resources. The Congressional Act of July 26, 1866 and the General Mining Law of 1872 granted all American Citizens the right to go into the public domain to prospect for and develop minerals located there. Every mining law or act enacted since then has contained a "savings clause" that guarantees that the originally granted rights have never been rescinded. We recognize that mineral development can occur concurrently or sequentially with other resources uses. We require that all project planning address the need for maintaining mineral and energy related access in mineralized areas. It is also our policy to encourage value-added mineral and energy industries.

DEIS Threatens and/or Discounts Existing Rights

Lack of References to Mining Laws

Vol 1, Page 16 lists applicable laws governing forest management. The General Mining Law and the National Minerals Policy Act are left out; they should be included.

Vol 2, Page 441 states, "A determination that resource values exceed the known mineral value could result in a recommendation to withdraw an area from mineral entry". In order to meet the requirements of the Baker County NRP, no areas should be recommended for withdrawal without coordination with the County. Mineral extraction can and should take place alongside other multiple uses, thereby attaining the "resource values" mentioned above without excluding mining.

Failure to Recognize Legal Protections of Mining

Vol 1, Page 190 states, "Commercial use in wilderness is controlled by special use permits and the operation plans that are required under special use permits". There is a need to add that mining can take place under plans of operation.

Vol. 1 Page 205 states, "Grazing would be allowed as a permitted activity. Mining would be allowed to continue unless the area is withdrawn from mineral activity". This is not correct, valid existing rights will continue even after land withdrawal.

Vol 1, Page 209 states, "Prospecting for new claims within wilderness has largely ended." This statement is incorrect.

Access

Given the DEIS' emphasis on road decommissioning, disallowing new roads, and not maintaining existing roads, we are concerned about the effects on mineral rights.

Vol 1 Page 240 states, "Little, if any, future road construction is likely for any of the alternatives. Alternatives B, C, E and F include objectives for decommissioning roads, although at low levels…No road construction on soils are expected for any of the alternatives." The document should acknowledge valid existing rights and mining, which may require new roads.

Water Quality Inaccuracies

Page 317 Vol 1 states that at Ashgrove, "*mercury laden residue enters the river*". This statement should be removed. It is not true.

Wildlife

The DEIS assumes mining will be incompatible with other uses, such as wildlife habitat. Vol 2, Page 199 states "Mining is not always compatible with wildlife". Page 199 Some mining activities use or produce toxic material." This ignores the benefits that mining can produce, such as keeping fish spawning habitat churned and soft.

Socio-Economic Impacts Are Underestimated

Vol 1, Page 88 discusses economic and employment contributions of recreation, timber production, and forage production, but not mining. This is an oversight.

Vol 1, Page 107 indicates there is 1 mining job in the WWNF. We who live here know this is not correct.

Vol 1, page 94 states that "mineral production affects very few people and businesses." This is incorrect. Not only are minerals crucial to every person in the country, but miners in Baker County spend money for fuel, food and other supplies to support their mining operations. Even for small mining operations, fuel bills are usually in the hundreds of dollars each month they are in the field. Ash Grove Cement is one of the major employers in Baker County, not to mention the aggregate industry.

On table 54 page 107 of your proposed plan you indicate there is only 1 mining job. There are a lot of miners out there that would probably disagree with your narrow interpretation of mining.

Vol 3 Page 236, locatable minerals are excluded from the "suitability" matrix. Why?

Vol 3, p. 252, where Goods and Services are addressed, locatable minerals should be added. The Objective should be to approve Plans of Operation within one year of submittal.

Grazing Concerns

Importance of Grazing in Baker County

Livestock production has customarily been and continues to be a significant contributor to the economic stability of Baker County. With over $40 million in annual sales, livestock production totals 63% of all agricultural sales in Baker County.

Livestock producers who graze on public land have been issued grazing permits based on ownership of private land. The ownership of private land involved in livestock production that is adjacent to public land gave that producer the right to obtain a grazing permit on those public lands. This right was defined in the Taylor Grazing Act of 1934.

In Baker County, many livestock producers rely on these grazing permits through the U.S. Forest Service.

In 2009, the Whitman Ranger District of the Wallowa Whitman National Forest had 51 designated cattle allotments that total 749,946 acres. The carrying capacity of these allotments equals 31,810 AUMs (Animal Unit Months). The seasons of use vary on these allotments, but most extend from June 1-September 30, although some begin as early as April 15 and some end as late as October 31.[15] The preservation of these permits will continue to be an important factor in sustainable livestock production in Baker County.

Baker County Requirements for Grazing

We require preservation and protection of livestock production and practices, a significant part of our heritage and contributor to our economic base. We call for management on USFS land that uses livestock grazing to improve the range conditions for livestock and wildlife. We promote grazing as a primary tool to create healthy forests and to prevent the spread of wildfires. We require managing rangelands to maximize production. Noxious weeds will be controlled through grazing, herbicide applications and other measures on all lands in Baker County. Sagebrush and juniper control will be allowed and encouraged with herbicide applications, mechanical treatment or fire.

Grazing decisions will be based on sound science as supported by proper monitoring, reporting and data analysis. Grazing decisions to conserve an endangered species will be made only if grazing

[15] Range Management Specialist, Whitman District, Wallowa Whitman National Forest 11/17/2009

can be proven to be detrimental to the species on that allotment. Grazing decisions after a wildfire will be based on sound science on an individual allotment basis.

Grazing's Treatment in DEIS

Throughout the DEIS, grazing is treated as an overall negative. Nothing could be farther from the truth. Language in the "Vision" portion (p. 16 of the RLMP) exemplifies the bias against grazing. It says grazing "the potential to impact the condition" of resources. It also mentions the perceived conflict between domestic and bighorn sheep. However, aside from grazing supporting "traditional lifestyles and local economies," this section says nothing of the positive effects of grazing on the environment. Language should be added: "Livestock grazing is crucial to reducing the severity and frequency of unwanted wildfire. Well-managed grazing promotes healthy soils, root systems, forage growth, and wildlife diversity. It can and should be used as a tool to control invasive species, and to promote range health, generally."

Grazing's Environmental Importance

We believe the research included in the document was one-sided. When conflicting scientific information exists, the agencies may only rely upon a particular scientific conclusion after having considered and addressed contrary conclusions. *See Hughes River Watershed Conservancy v. Glickman*, 81 F.3d 437 (4th Cir. 1996), appeal after remand, 165 F.3d 283 (4th Cir. 1999) (upholding an agency decision to rely on the conclusions of a scientific study after considering and responding to contrary findings of a similar study); *Roanoke River Basin Ass'n v. Hudson*, 940 F.2d 58, 64 (4th Cir. 1991) (stating that an agency is required to address specific concerns and explain why it found them unpersuasive).

The USFS does not explain its reasons for finding such contrary scientific opinions unpersuasive. Indeed, it did not even acknowledge that contrary opinions exist. Therefore, the USFS has not fully satisfied NEPA requirements concerning the environmental impacts of the Proposed Plan. Below are references to several studies that should have been considered. It is not a comprehensive literature review, but is meant to give examples of the one-sided nature of the studies USFS chose to include.

a. The western ecosystem evolved with large-herbivore grazing, and losing public lands grazing would severely damage ecological balance (Burkhardt, 1995).
b. Ranching on both public and private land "has been found to support biodiversity that is of conservation concern" (Knight, 2007). In the West, where productive, private lands are interspersed with large areas of arid, less desirable public lands, biodiversity of species depends greatly on ranchland. According to Rick Knight, a biology professor at Colorado State University, ranching on both public and private land "has been found to support biodiversity that is of conservation concern" because it "encompasses large amounts of land with low human densities, and because it alters native vegetation in modest ways." [16] Knight also noted that other uses – such as outdoor recreation and residential use – are not as conducive to the support of threatened or endangered species.
    a. Vol 2 p 197 states, "Domestic livestock grazing directly competes with wildlife for the use of available forage. Grazing results in plant defoliation, mechanical changes to soil and plant material, and nutrient redistribution (Belsky and Blumenthal 1997). These and other factors also influence successional trends."
    b. This publication was refuted by Borman, MM 2005, Forest stand dynamics and livestock grazing in historical context. Conservation Biology. Belsky describes all the bad effects of grazing and ignores the changes in management

[16] "Ranchers as a Keystone Species in a West that Works." Richard L. Knight. Rangelands Oct. 2007.

over past 100 yrs. Borman describes that overgrazing a century ago did what Belsky reports, but those effects are not true in proper grazing of current times.

c. The document often refers to grazing as having negative effects on riparian areas. However, in another publication by Borman et. al., it was found that "grazing can often be compatible with improving deteriorated riparian conditions and with maintaining those functioning properly." Borman, M.M., Massingill, C.R. and Elmore, E.W. 1999. Riparian area responses to changes in management. Rangelands, 21(3): 3-7.
d. Areas with flourishing and diverse plant and wildlife populations are often found in their present state because of, and not despite, the practice of grazing (NRCS, 2004). Wild birds, animals and rodents seek out and thrive in the shelter provided by natural ranch features, like diverse plant cover and windbreaks, as opposed to row-to-row crops or bare landscapes. Large animals such as elk and deer are known to thrive in areas where cattle graze.[17]
e. Grazing improves wildlife habitat by increasing the quality and accessibility of grasses and forbs (Neel 1980, Derner et al.1994, Evans 1996).
f. Grazing stimulates plant and root growth and allows sunlight to get through to the growth points. Hoof movements soften the hardened earth so that seeds can germinate and grow and water can penetrate (Savory, 2010). Well-managed grazing encourages healthy root systems and robust forage growth.
g. For those concerned by carbon emissions, livestock grazing is a contributor to carbon sequestration: well-managed grazing's impacts on soil and plant composition can create a "carbon sink" effect (Derner et al., 2002).
h. Improving range science and management practices are bettering the condition of the range (CAST, 1996).
i. Ranchers are often first responders to wildfire, and grazing greatly reduces the risk of catastrophic wildfire (Davies, 2010).
j. Grazing can be used to control invasive weeds (Olson and Lacey 1994, Walker et al.1994). Other research suggests that livestock grazing helps prevent invasion by non-native grasses, which threaten plant biodiversity on the land.[18] Ranchers' brush control also benefits wildlife, helping more grass to take root and decreasing the spread of cheatgrass, a highly flammable invasive weed. A study in the *Journal of Rangeland Management* concluded that "from an ecological standpoint we can argue that if we remove the grazing infrastructure from public rangelands, we would see some adverse consequences. We'd see less variety and too much ground cover, for example, as well as more cheatgrass and the potential for more range fires."[19]
k. Ranchers' water improvements provide habitat where none existed before (Marty, 2006). The improvements ranchers make to water sources – building, maintaining and protecting reservoirs and stock ponds, for example – can improve and, in some cases, create, wildlife habitats.[20]
l. Grazing makes productive use of a renewable, otherwise unusable resource—grasses and shrubs out on the range—turning them into a high quality source of protein and fiber for a growing population. This is particularly significant given the fact that thousands of acres of open space are lost in the United States each day (USDA Forest Service, 2006).

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[17] Texas A&M University-Kingsville (2005). *Cattle Management to Enhance Wildlife Habitat in South Texas*. Wildlife Management Bulletin of the Caesar Kleberg Wildlife Research Institute, Management Bulletin No. 6, 2005.
[18] Ranching as a Conservation Strategy: Can Old Ranchers Save the New West? Mark W. Brunson and Lynn Huntsinger. Rangeland Ecology Management 61:127-147 March 2008.
[19] "Vegetation Change after 65 Years of Grazing and Grazing Exclusion." Barry Perryman. Journal of Rangeland Management Dec. 2004.
[20] http://cesantaclara.ucdavis.edu/files/33367.pdf

m. Losing grazing on public lands would likely force many privately-held ranch lands to be converted to other uses, such as intensive farming and development. Furthermore, as a stipulation of their federal permits, many ranchers provide public access across their private land, and keep the boundaries free of fences. A study by Mark W. Brunson and Lynn Huntsinger published in the journal *Rangeland Ecology Management* explained that "Saving ranches has become a focus not only of rural traditionalists and livestock producers but also of conservationists, who prefer ranching as a land use over exurban subdivisions." [21] Page 157 of the DEIS acknowledges "The open space offered by National Forest System lands becomes increasingly important especially as private lands are developed for home sites. This is applicable to Baker County. P 331 Vol 2 also acknowledges: The pressure for development of this land into smaller and smaller parcels will continue to reduce the quality and availability of big game winter habitat.

n. Many ranchers across the West are purposefully implementing grazing practices to improve habitat and help prevent the addition of species such as the Greater Sage-grouse (GSG) to the Endangered Species List. (According to the Natural Resources Conservation Service, ranchers have, among other efforts, invested approximately $70 million in GSG conservation efforts and instituted improved grazing systems on over 2 million acres over that past three years, which is expected to increase GSG populations by 8 to 10 percent.[22])

USFS Did Not Consider Economic Implications of Reducing AUMs

The USFS has not sufficiently addressed the economic impacts of its Proposed Plan. Under the NFMA, The USFS is required to promulgate regulations "under the principles of the Multiple-Use Sustained-Yield Act of 1960, that set out the process for the development and revision of [] land management plans." 16 USC § 1604(g). These regulations must include "specifying guidelines for land management plans . . . which insure consideration of the economic and environmental aspects of various systems of renewable resource management." *Id*. at §1604(g)(3)(A).

USFS regulations developed pursuant to the NFMA require land management plans to account for "[s]ocial, cultural, and economic conditions relevant to the area influenced by the plan," as well as the "[m]ultiple uses that contribute to local, regional, and national economies in a sustainable manner." 36 C.F.R. § 219.8(b)(1), (3). The Proposed Plan does not truly account for economic and social impact to local communities it will affect.

The United State Supreme Court has emphasized that NEPA "[does] not require agencies to elevate environmental concerns over other appropriate considerations." *Baltimore Gas & Elec. Co. v. Natural Res. Def. Council, Inc.*, 462 U.S. 87, 97 (1983); *See Stryckers' Bay Neighborhood Council v. Karlen, 444 U.S. 223, 227 (1980).* Additionally, the Second Circuit has found that environmental considerations are not the only factors to be considered when conducting a NEPA analysis, stating that "the Act mandates no particular substantive outcomes." *City of New York v. U.S. Dep't of Transp*., 715 F.2d 732, 748 (2d Cir. 1983).

Many of the land use restrictions that would be put in place by the Proposed Plan would impose significant restrictions and loss of forage for the livestock industry. For example, the Proposed Plan would result in significant changes to the number of acres classified as riparian habitat conservation areas and riparian management areas. DEIS Vol. 1 at 309. Increasing the size of

[21] Ranching as a Conservation Strategy: Can Old Ranchers Save the New West? Mark W. Brunson and Lynn Huntsinger. Rangeland Ecology Management 61:127-147 March 2008.
[22] Natural Resources Conservation Service, USDA (2013). *Sage Grouse Initiative: Tracking Success*. Report. http://static.sagegrouseinitiative.com/sites/default/files/sgi-tracking_success-final_low_res-020613.pdf

these areas restricts the ability to utilize them for livestock purposes. The USFS should prepare a more extensive analysis of the economic and social effect of its proposed land uses.

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Under the preferred alternative (Alternative E), allowable utilization of available forage on suitable grasslands would be reduced from 50 – 55 percent to 35 – 45 percent. DEIS Vol. 1 at 149. The USFS asserts that "[t]his would be a modest change with a limited effect since utilization in the uplands does not exceed 35 to 40 percent in most active allotments." *Id.* The DEIS does not document or state which allotments it believes fall into this category or what the economic effect of this reduction would be in those areas.

If these restrictions go into effect, lands suitable for grazing would be severely reduced. The USFS has not addressed how these restrictions related to areas occupied by bull trout will impact the economic and social well-being of the communities that rely on lands for grazing purposes.

As another example, the USFS notes that "[t]he effect of [a larger elk population] could increase the grazing pressure on forage and browse plants, especially when the increased wild ungulate population is added to permitted livestock." DEIS Vol. 1 at 156. The result of this will likely be "and a slow decline in permitted livestock (or in the case of some of the alternatives, a rapid and significant decrease in permitted livestock)." *Id.* However, the DEIS does not indicate how this possible rapid decline in permitted livestock will affect livestock operations in terms of lost productivity, the local communities, or their social structure.

AUM reductions can have devastating ranch-level effects (See Torell et al, Ranch-Level Economic Impacts of Altering Grazing Policies on Federal Land to Protect the Greater Sage-Grouse, 2014). USFS is required by law to do a thorough review of such effects, as well as an analysis of the "mutliplier effect" that will result from lost AUMs in local communities and beyond.

Utilization Concerns

Vol 3 p. 319 states, "It is assumed in this document that, in general, utilization of 40 percent or less of the forage on the landscape would result in proper management…" This "assumption" is seriously flawed. At current grazing levels, which are currently as high as 60 percent, USFS admits in this very document that rangelands are generally trending upwards. The new guidelines presented on pages 273 and 299 of Vol 3 propose a more one-size-fits all set of standards than what exists today. They propose to eliminate the varying levels of grazing management (intensive, extensive, stewardship), and also eliminate the "forested," "grasslands," and "shrublands" identifications, all of which get different treatment under existing guidelines. Thus, the new guidelines are less adaptable to variations in rangelands and in preferred management regimes. The preferred alternative proposes utilization levels of 40% (max) across the board--up to 10% lower than existing levels on riparian areas, and up to 20% lower than existing levels on upland areas. Not only that, Alt E proposes a 4-6 inch stubble height on riparian management areas, and a 20% maximum "bank alteration" level.

The document states repeatedly that there are upward trends in range health in the planning area. This has been the case even as utilization levels have well exceeded 40% on both riparian and upland areas.

The DEIS' utilization levels are not based on a balanced consideration of range science. The proposed levels are generally too low and will encourage wildfire in many cases. They will also

detract from healthy grass and forbs growth. Furthermore, utilization should not be a number, but rather a range of use to achieve proper use that effectively addresses the needs of the plant community and the season of use it is applied to (i.e., 40-60%). Focusing on a single number is impractical, as grazing use is measured on average use not a specific number. A Single number goal merely invites conflict and argument (litigation). The same applies to stubble height. If the existing plant community identified is not capable of 4-6 inches of growth in the absence of grazing, how would stubble height be measured and also grazing use?

Utilization and stubble height should guide management, not be objectives in themselves. J. Wayne Burkhardt wrote in Rangelands 19(3), June 1997:

As interest and concern about the environment and public lands has markedly increased in recent years, there has been an increasing effort to manage livestock grazing on the basis of utilization standards or limits.

This deceptively simple concept has become popular with environmental reformers opposed to public land grazing and with agency administrators caught up in the political crossfire of land use reform. Grazing use levels or "proper use factors" have long been part of the "tools" used by rangeland managers. Recently though, the tendency has been to base grazing management decisions solely on achieving predetermined use levels at "key sites" on pastures or allotments. This approach may provide simple and efficient "grazing administration" but it does not result in effective grazing management.

Burkhardt ends this article by stating:

The across-the-board application of conservative use standards to public land grazing is poor resource management and poor public policy. It puts the public land grazing permittee in an impossible position, reduces management agencies to policing operations and gives the radical environmentalists a wonderful tool to beat up the agencies and the ranchers. It is poor public policy that puts renewable resources off limits to the production of food and fiber and shifts that production to non-renewable resource based technology.

Bill Krueger wrote in Stubble Height and Utilization Measurements: Uses and Misuses, May 1998, "The most prominent area of agreement was that utilization is a land management tool, not a land management objective".

In another part of the paper he states: "Another concern about the accuracy and use of utilization data is that often the personnel using the methods are inadequately trained."

Stubble height comes into the conversation, as stubble heights are based on height weight curves and set on desired percent utilization. A University of Idaho study on stubble height is states: "Clary and Leininger (2000) proposed a 10 cm (4 in) residual stubble height as a "starting point for improved riparian grazing management." However, they acknowledged that in some instances, 7 cm (2.75 in) may provide adequate riparian protection and in others 15 to 20 cm (6 to 8 in) may be required to limit streambank trampling or to reduce willow browsing. The criteria could vary depending upon local environmental variables, condition and trend of the stream, species composition on the greenline and the season, frequency and duration of livestock use. Thus, stubble height criteria not only can but should be adjusted through adaptive management, based on riparian conditions and trend *(see Process for Adaptive Management).*

McLean, A. & S. Wikeem in a JRM paper titled: "Influence of season and intensity of defoliation on bluebunch wheatgrass survival and vigor in southern British Columbia". (*Journal of Range Management, 28* (1), 21-26.), they showed that with Bluebunch wheatgrass the most damage occurring with spring defoliation to a stubble height of 5 cm. Spring defoliation leaving 10-15 cm showed less damage. Fall defoliation to a stubble height of 5 cm and season-long grazing to a

height of 20 cm showed no damage. Indicating that not all grazing intensities have the same effect and that basing utilization limits based on what fish was in the stream makes no sense.

Bluebunch wheatgrass is generally the most sensitive species to grazing intensity, therefore looking at these numbers even Bluebunch wheatgrass can be grazed at 10 cm successfully in most instances. Rotational grazing as a possible management tool needs a place in this forest plan.

Different papers by Richards and Caldwell (1985) and Busso et al (1990) point out "Synchoronous tiller development increases the susceptibility of bunchgrasses to a greater loss of active shoot meristems when grazed after internode elongation. This also contributes to wide variations in grazing tolerance with the progression of phonological plan development. For example, the grazing sensitive bluebunch wheatgrass is quite tolerant of defoliation in the early spring when culmless, because active intercalary and apical meristems are located at or below ground level. However, defoliation tolerance decreases rapidly following internode elongation.

As such, utilization standards and stubble heights should not be defined as standards or guidelines in the forest plan. The forest plan should lay out the desired conditions and then identify topics or issues of concern and possibly ways to mitigate it.

USFS should review and include in future decision-making the following materials:

J. Wayne Burkhardt. Grazing Utilization Limits: An Ineffective Management Tool. Rangelands 19(3), June 1997.

Heitschmidt, R. et al. 1998. Stubble Height and Utilization Measurements: Uses and Misuses. Bulletin WCC-40, USDA Agricultural Research Service, Ft. Keogh Livestock and Range Research Laboratory, Miles City, MT 59301.

University of Idaho Stubble Height Study Report. By: University of Idaho Stubble Height Review Team. July 2004.

Borman, M.M., Massingill, C.R. and Elmore, E.W. 1999. Riparian area responses to changes in management. Rangelands, 21(3): 3-7.

Pieper, R.D. (1994). Ecological implications of livestock grazing. in: M. Vavra, W.A. Laycock, & R.D. Pieper (Eds.), *Ecological implications of livestock herbivory in the West* (pp. 177-211). Society for Range Management. **

McLean, A. & S. Wikeem. (1985). Influence of season and intensity of defoliation on bluebunch wheatgrass survival and vigor in southern British Columbia. *Journal of Range Management, 28* (1), 21-26. ***

"Desired Condition" May Exclude Non-native Desired Species

USFS' "desired condition" for ranges could put a great portion of WWNF grazing areas into "moderate or greater departure from desired condition," category--thereby putting in place lower utilization standards. The following, from Vol 1 p. 130, could be interpreted in a way that puts areas with non-native (but desirable) grass species, which are now in "satisfactory" condition, in "unsatisfactory" condition purely because of the type of species:

The desired conditions are defined by layers of management direction. A desired condition is identified where HRV objectives with the Public LURs definitions of satisfactory condition (i.e., fair range forage condition with an upward trend or better) are met by attaining a <u>mid-seral ecological status</u> with an upward trend or higher condition based on the PNC…(emphasis added).

The above indicates that "mid-seral ecological status" should be attained to meet "desired conditions." What the layman may not know is that "mid-seral" status applies only to native grasses. Many past restoration efforts have rightly involved seeding of non-natives. This "desired condition" is unacceptable.

Endangered Species "Protections"

All the above is before taking into account endangered species "protections" (which are more likely to result in wildfire and overgrown forests than in "protection"). Examples:

- Utilization in ESA species habitat, generally, is 30%. Since an endangered species can inhabit a small portion of a very large pasture, that could well mean 30% on thousands of acres that have no endangered species habitat.
- Utilization in bull trout habitat would be just 25% max. If the anadromous fish and bull trout restrictions proposed here are put in place, grazing on the three national forests will be reduced by over half. Thus, while USFS claims that Alt E will have the same number of acres "suitable for grazing," this cannot be true.
- From May 15 to Aug 30, grazing in any pasture with silene spaldingii would be generally prohibited altogether. Again, in the absence of fences, this could effectively mean no grazing on thousands of acres where silene spaldingii are nowhere in sight.

The above does not even account for the thousands of acres that will be lost to grazing due to bighorn sheep (BHS) restrictions (see BHS section below).

Effects of Other Proposed Plan Components on Grazing

Lack of Fuels Management

Every alternative would restrict timber management to where harvest levels were even lower than the current, inadequate levels. Lack of timber management increases fire threat, which can put ranchers out of business or force them off their ranges for years at a time. Heavy canopy cover also reduces forage (understory) growth.

RLMP p. 15, "Vision," states that conditions including "increasing vegetative density" may "put the ecosystem at high risk of uncharacteristically large and sever fires…" USFS should recognize in this section that management decisions to reduce grazing and logging have contributed to this problem.

Lack of Access

The proposed reduction in road densities (including nonmotorized backcountry and general lower road density across the board) poses a threat to ranchers' access, and increases the likelihood that wildfire will get out of control.

Economic Effects Underestimated

Vision (RLMP p. 71) "Grazing…contributes to local ranching operation sustainability and local community growth while maintaining or achieving ecological desired conditions" (emphasis added. Grazing's economic contributions are given less importance than ecological "desired conditions." Either add that "local ranching operation sustainability and local community growth must be maintained or achieved," or take out the reference to ecological desired conditions.

While on p. 113, Vol x, the DEIS states "*The amount of cattle grazing... would be generally the same for Alternative A,B,D,E and F,*" this is not born out in the document. In fact, Vol. 2 p. 34 states it outright: The degree to which alternatives would result in watershed and riparian improvements through reduced livestock grazing in both riparian areas and uplands, and active restoration of roads and upland vegetation, will likely benefit aquatic species…" Furthermore, Table 57 (DEIS Vol. 1 at 113) displays the permitted AUMs under each proposed alternative. It shows that all alternatives would result in a reduction in total AUMs. Even under Alternative A—the "no action" alternative—there would be a reduction in total AUMs for cattle and sheep of 13,923 AUMs for the WWNF. Such discrepancies should not exist in the planning documents of

major agency action like the planning of national forest management. Nor should there be a reduction in total AUMs in the "no action" alternative.

Bighorn Concerns

Domestic sheep and bighorns have co-existed in many of the same areas for decades without any apparent problems; or that the most common respiratory diseases in bighorn can't be tied to a single, identifiable pathogen in domestic sheep; or that there are bighorn die-offs in areas far removed from any domestic sheep. And never mind what will happen when sheep are removed from the landscape—from increased wildfire threat to decreased open space provided by private ranches.

Bighorn management should be a state issue. Science surrounding disease transfer is inconclusive. (p. 16 RLMP)

Such decisions are based on the concept of "species viability," which is found in USFS regulations, but nowhere in USFS' authorizing statutes. "Viability" is an undefined term that provides too many opportunities for draconian decisions such as the proposed BHS-related standards found here.

Several national and state livestock associations are currently litigating USFS for its use of what industry has called "spurious" science and modeling. The industry groups charged that USFS failed to provide adequate science relating to disease transmission between bighorn sheep and domestic sheep, as well as an accurate risk-assessment model. For example, USFS assumes that domestic-bighorn interaction will result in disease transmission 100 percent of the time. This assumption is based on a study where researchers took cultures from known-infected domestic sheep and placed them directly in the trachea of bighorn—obviously not reflective of a real-life scenario on the range.

The arbitrary buffer zones put in place or proposed by USFS in various areas, ranging from 7 to 9 miles, is not explained or supported by science.

In 2009, a federal judge directed USFS not to use the model that is driving its BHS/domestic policy, declaring that the agency had violated FACA with their proceedings. In 2012, when it was apparent that USFS was continuing to make decisions based on their model, Congress stepped in. Congressional appropriators put a yearlong hold on any domestic sheep removals from the Payette and directed USFS to work with USDA's Agricultural Research Service disease experts to come up with a more solid scientific basis for their bighorn decisions.

BHS die-offs are caused by many factors, yet USFS puts sole focus on domestic/BHS interaction. Yet, BHS herds that haven't had contact with domestic sheep for 30 years have been having pneumonia outbreaks and die-offs. Other wildlife as well as some BHS themselves are carriers of the pathogens causing die-offs in non-resistant BHS. Stressors such as depredation are thought to play a large role. In short, the approach of zero-tolerance for domestic/BHS interaction is in violation of USFS' multiple-use mandate and should be abandoned.

It should be noted that the pathogens responsible for the BHS die-offs are endemic—meaning they aren't going away. The state of OR should be concerned with finding BHS that are survivors, and promoting their reproduction.

Sage grouse Concerns

The County does not believe that livestock grazing and sage-grouse conservation are mutually exclusive. To the contrary, a robust grazing program actually ensures the health of sage-grouse habitat. Nevertheless, the proposed revisions appear to put sage-grouse conservation on a higher footing than livestock grazing and forage production, which would be a violation of the multiple-use statutes governing USFS.

The County urges USFS to recognize its responsibility to support existing grazing levels and increase the productivity of the range in conjunction with seeking to conserve sage-grouse habitat and populations. The DEIS spends an inordinate portion of the analysis on grazing in comparison to primary threats to the birds' survival in Oregon (predation, wildfire, habitat fragmentation). Unlike some land management activities, grazing is most often beneficial to sage-grouse habitat. Nevertheless, the "preferred" alternative focuses on reductions to and restraints on livestock grazing that could have debilitating effects on permittees' ability to keep their operations running (and thus continue providing benefits to sage grouse). This alternative actually jeopardizes habitat by increasing wildfire risks (increased fuel loads and continuity of fine fuels), which U.S. Fish and Wildlife (FWS) identified as a primary threat. Reducing forage productivity and availability on USFS land could also result in additional habitat loss on private land, as well as increasing urbanization. The negative effects on sage-grouse populations resulting from restricting grazing outweigh any potential benefits. USFS proposed amendments would undercut a balanced grazing program in favor of overly restrictive management standards.

Water/Watershed/Riparian Area Concerns

Baker County's watersheds provide water for urban and rural families and are essential for healthy and sustainable agriculture, livestock, industry, fish and wildlife. These watersheds provide recreation opportunities for residents and tourists, serve cultural needs, and provide habitat for native plants, wildlife, and fisheries. The health of the County's watersheds directly affects the current and future availability and quality of the water resources and water-dependent natural resources in the County, and the ability of watersheds to adapt to climate variability (i.e., periods of drought, periods of high rainfall, rain-on-snow events).

Baker County supports the development and pursuit of watershed improvement goals, objectives, programs and projects by County, State, and Federal Agencies and the many corporations and private landowners/managers in the County (Appendix I). The County supports these objectives because of the benefits residents of Baker County and of the State of Oregon receive from good watershed management. Further, the County supports the objectives of the Oregon Plan for Salmon and Watersheds as they apply to Baker County and landowner-sponsored projects funded by the Oregon Watershed Enhancement Board that help implement that plan in Baker County.

1. Maintain site-appropriate ground and canopy cover in grasslands, shrublands and forestlands, including wetlands and riparian areas, to: a) dissipate rainfall energy and promote infiltration of rainfall and snowmelt; and b) minimize erosion, sedimentation and runoff that exceeds natural levels.
2. Improve natural water storage capacity of degraded watersheds by improving ground cover of uplands, rehabilitating gullied slopes, and reconnecting entrenched perennial, intermittent and ephemeral stream channels with their floodplains.

Water rights in Baker County date back to the early 1860's. The dates on priorities (filing dates) trace the mining ventures and settlement of farms in the Baker Valley, with the better alluvial soils, and non-intermittent stream flows holding the oldest water rights. Oregon water law is based on two legal principles – appurtenance to the land, and first-in-time, first-in-use priority. Baker County policy is to protect the legal concept that water is appurtenant to the land, and to not allow any diminution of water quantity in water rights.

USFS Attempts to Exceed Its Authority over Water

The USFS must stay within the bounds of its own management jurisdiction. The agency holds federally reserved rights to fulfill its two primary purposes: to furnish a continuous supply of timber for the people, and to conserve water flows. In order to fulfill secondary purposes such as wildlife protection and instream flows, USFS is required to apply for water rights in accordance with the procedures of the Oregon water code.

USFS' calling for "Connectivity" between watersheds, for example, is outside the agency's authority. So is USFS' focus (p. 24 of RLMP) on "Instream flows, including water yield, timing, frequency, magnitude, and duration runoff…"

A standard for riparian management areas in Alt. E (Vol 3 p. 306 – RMA-HYD-1 S-56) states: "Authorizations for all new and existing special uses, including, but not limited to water diversion or transmission facilities (e.g., pipelines and ditches), energy transmission lines, roads, hydroelectric, and other surface water development proposals, shall result in the reestablishment, restoration, or mitigation of habitat conditions and ecological processes identified as being essential for the maintenance or improvement of habitat conditions for fish, water and other riparian dependent species and resources. These processes include in-stream flow regimes, physical and biological connectivity, water quality, and integrity and complexity of riparian and aquatic habitat" (emphasis added).

The proposal to regulate—via denial of special use permits–in-stream flows, physical and biological connectivity, water quality, and "integrity and complexity of riparian and aquatic habitat" is far beyond USFS' authority.

On page 2, the EIS states the Forest Service will "provide clean and cold water." There is no way USFS can commit to providing cold water in south-facing flashy watersheds such as the North Fork Burnt River. These streams come out fast in the spring, then there are low flows during the hot summer months. These waters were never naturally cold, and no matter what the Forest Service says, these waters will remain warm.

USFS Inappropriately Focuses on Wildlife, Discourages Human Use and Management

USFS propsoses to violate Multiple Use statutes in its proposals to regulate water and water uses within the planning area. It would take water use away from human use and focus on wildlife "benefit" only.

- Example 1: "Key watersheds" cover large area and focus only on wildlife use. "The role of key watersheds is to serve as habitat refugia for existing populations and to provide sources of individuals that are able to colonize new habitats as conditions improve. The management emphasis in all key watersheds is to protect existing populations and their habitats while incurring the lowest level of risk to those populations…" (RLMP p. 22)
- Example 2: "**Desired Condition:** Networks of watersheds with good habitat and functionally intact ecosystems contribute to and enhance conservation and recovery of specific threatened or endangered fish species and provide high water quality and quantity. The networks contribute to short-term conservation and long-term recovery at the major population group, core area, or other appropriate population scale." Increasing production of timber, minerals, and forage for livestock should be included as desired conditions.
- Removing "human intervention" should not be a goal, as stated in "All Watersheds – Desired Condition" (p. 23 of RLMP): "The watershed-scale processes that control the routing of water, sediment, wood, and organic material operate at levels that result in self-sustaining riparian and aquatic ecosystems that do not require human intervention or restoration." Productive uses (timber, mining, grazing) should be included as part of the desired condition.
    - RLMP p. 23 states: "The alteration or removal of vegetation or ground cover by activities such as fire, timber harvest, the use of mechanized equipment, livestock grazing, and the construction of roads alters hydrologic pathways in ways that can result in increased hillslope and stream channel erosion rates." This

statement is true for wildfire, but not true for managed timber harvest, use of most roads, and grazing. “Alteration or removal of vegetation” can be a positive for “hydrologic function”--not just a negative. In fact, it is necessary to prevent catastrophic wildfire.

Riparian Management Areas

RMAs constitute 29 percent of the general forest area for the three forests. These areas should be governed by adaptive management, instead of by the restrictive regulations put forth in the preferred alternative. As addressed below, riparian areas are defined too broadly; pose a threat to multiple uses; and pose a threat to the resources.

1. **RMAs Are Defined Too Broadly**

Riparian management areas “ include traditional riparian corridors, wetlands, intermittent headwater streams, and other areas where proper ecological function is critical to maintenance of the streams’ water, sediment, woody debris and nutrient delivery system”. Page 231 Chart shows 362,500 acres locked up in the riparian stream buffers. This chart should show the acres for alternative A (without the 100 foot buffers on ephemeral streams.)

We question USFS’ excessive buffer widths, which appear to be dictated by the Region’s *Aquatic and Riparian Conservation Strategy* (ARCS). ARCS adopted the buffer widths originally imposed by PACFISH/INFISH, which were intended to be interim measures until better science was available. They were based largely on conditions farther west, which are much wetter. This, combined with the fact that they were made very wide as a “precautionary” measure in the absence of adequate scientific data, makes them inappropriate for use in this plan revision.

Page 309 of “RMA widths and extent are similar to RHCAs except that a width of **100 feet** would apply to all seasonally flowing streams and small wetlands, whether or not the streams are fish bearing.” Vol I Page 31 indicates a buffer width of 100 feet on dry streams would apply throughout the entire plan area in the preferred alternative. There is no science behind the increase in buffer from 50 feet to 100 feet along ephemeral streams. Ephemeral streams are not riparian, nor do they flow water that needs to be cooled. They have no riparian vegetation, and have narrow floodplains. The additional 50 feet of buffer is not necessary, and would put off-limits a huge area now available for timber harvest. Under the current 1990 forest plan riparian areas are in good shape. There is no rationale for increasing the buffer along ephemeral drainages, which are actually non-riparian, by an additional 50 feet. Oregon’s private timber lands are in excellent shape, despite the narrower buffers. Decreasing the area available for harvest is not justified.

Volume 1 Chapter 3 states on page 273, *“Both agencies recognize that stream shade provided by riparian vegetation has the most widespread achievable effect on reducing stream temperatures”*. The Forest Service is not correct that stream shade can reduce stream temperatures. Stream shade can only function to maintain the water temperature.

2. **Riparian Areas Not In Need of Additional Regulation** In Volume 1 page 25, the DEIS indicates that the 1990 Forest Plan RHCA buffers have resulted in healthy, functioning riparian areas throughout Baker and Grant Counties.

Page 309, states “RMA widths and extent are similar to RHCAs in the 1990 Forest Plan, and riparian areas have been on an upward trend since the 1990 Forest Plan and the INFISH and PACFISH amendments.” No changes in stream buffers are evidently needed.

Vol 2 Page 12 “riparian and aquatic habitat conditions are currently trending upward at the scale of he plan area following 15 plus-years of management under the 1990 Forest Plan”.

Monitoring Problems

On Page 110/111 of the RLMP, USFS proposes a monitoring plan framework for the action alternatives. Among the problems with this section:

1. "Status of selected watershed conditions" will be considered in the monitoring plan. However, DEQ does not regularly remove streams from the 303d list without someone initiating the process after many years of monitoring and then the process could take years. This is not a valid monitoring protocol.
2. USFS attempts to determine trends in 3-5 years on matters such as watershed condition; riparian vegetation condition; invasive species; and aquatic habitat. No trends will be detectable in a 3-5 year timeframe.

Other Concerns

Page 271states, "sediment is a natural function in lower gradient streams." The DEIS should reflect the fact that sediment is also a natural function of south facing high gradient streams.

Page 27 lists hydrologic unit code: 4th-code HUC a sub basin 450,000 acres; 5th-code HUC a sub basin 40,000-250,000; 6th-code HUC a sub basin 10,000-40,000 acres.

Where do 250,000-450,000 fall?

Vol 3 Page 12 defines "Channel" as "the deepest part of a stream…" This is not how the term is used in the rest of the document.

Vol 3 Page 182-183: hydrologic function should be "within the natural range of variability." Does USFS know what this is? If so, they should disclose to the County.

Climate Change Concerns

Climate change is an inevitable constant. It is also very unpredictable. We are very concerned about relying on the idea of climate change when promulgating rules that may affect management for years to come. The climate changes on natural cycles – warming, cooling, lengths of seasons etc. – and will continue fluctuating in the future. We strongly recommend the USFS develop a plan that allows local land managers the flexibility to make decisions based on the current conditions on the ground and in collaboration with state/local authorities, livestock permittees, and other vested stakeholders. We encourage the USFS to utilize the parameters of the National Environmental Policy Act (NEPA) process already in place that allow for categorical exclusions and streamlined local environmental assessments in case of changing conditions.

USFS Attempts to Predict the Unpredictable

On page16 of the RLMP, USFS states, "Average temperatures in the Pacific Northwest have increased by about 1 degree Celsius (1.8 degrees Fahrenheit) since 1900, and the rate of warming during the last 50 years is nearly twice the rate of the previous 100 years (ISAB 2007). The rate of warming is expected to increase in the 21st century. Mean annual temperatures are expected to rise by 0.3 degrees Celsius (0.5 degrees Fahrenheit) per decade through 2050 in response to continued increases in atmospheric greenhouse gases (Mote et al. 2008)."

The United Nation's climate change chief, Rajendra Pachauri, has acknowledged a 17-year pause in global temperature rises, confirmed recently by Britain's Met Office. Even if temperatures had increased, "climate change" is far too unpredictable to be the basis of forest planning decisions. Plans should simply employ adaptive management to accommodate changes in climate. For example, plans should allow for future new water storage facilities in the event that increased rains and decreased snowpack make water retention necessary.

USFS Attempts to Control the Uncontrollable

USFS describes "control of climate" as one of the forests' "ecosystem services." Controlling the climate is most certainly outside the capacity of USFS, even when considering all national forests combined. (Volume 3, page 18: "The combined resources and processes of natural ecosystems that provide benefit to humans, including, but not limited to, the production of food and water, the control of climate and disease, cycling of nutrients and crop pollination, spiritual and recreational benefits, and the preservation or maintenance of biodiversity."

USFS Proposes Damaging Decisions Based on Climate Change

Vol I Page 60: Management strategies include "reducing potential increases in stream temperatures through riparian buffers. Reducing the risk of water quality degradation by (1)Decreasing road density (2) closing, realigning or obliterating roads.

Vol I Page 59 states: "Management strategies to increase the adaptive capacity of terrestrial ecosystems in the face of climate change include: conserving species (whatever the climate does, this is not USFS' role, but the role of the state)."

Vol I Page 61 proposes "reducing barriers to species movement (close roads, destroy fences)…decreasing road density"

Recommendation in the Event of Climate Change

If USFS' predictions of climate warming and increased precipitation is true, then this will exacerbate the already overstocked dense timber stands with the potential of more catastrophic wildfires. Even more aggressive timber management would be necessary. This is not mentioned in the DEIS. In fact, the above proposals to destroy roads and "protect" species will only serve to diminish timber management.

Special Land Designations Concerns

Page iii Issue 6, states, "Public concern is heightened because the management to approach ecological resilience will determine the ecosystem services the Blue Mountains national forests provide". The public in Baker County really is concerned. Mismanagement and no management have left hundreds of thousands of acres in poor health and susceptible to insects and fire. The "management to approach ecological resilience" we see in the Blue Mountain Revision means a blueprint for a future Forest with less access, more wilderness, more wildlife corridors and non-motorized areas, wider "riparian" buffers on ephemeral streams, less timber management.

For the WWNF alone, the preferred alternative (E) proposes 20,300 acres of recommended wilderness areas; 104,500 acres of "backcountry" non-motorized use acres and 145,500 additional "backcountry" motorized use acres; 6,500 acres as "wildlife corridors;" over 52,900 acres of Wild and Scenic Rivers (existing and proposed); 8,000 in Research Natural Areas; and 362,500 acres locked up in Riparian management areas.

Socio-Economic Effects of Special Designations

Wilderness areas and similar designations (nonmotorized backcountry; wildlife corridors; Wild and Scenic; research natural areas) are lousy neighbors, shedding disease, insect infestations and wildfires onto neighboring private and public land. The designated areas that we now have are currently underutilized. With more designations, we would lose even more use of the Natural Resources needed to create jobs and recreational opportunities. We would lose the revenue that derives from these resources, which is desperately needed by Baker County's economy.

Research shows that the economic benefits that may result from special land designations usually does not outweigh the harm. According to research by Utah State University, Wilderness designations are "significantly associated with lower per capita income, lower total payroll, and

lower total tax receipts in counties" (Steed, 2011). The research found that wilderness impacts both households and counties. Average household income within Wilderness Counties was estimated to be $1,446.06 less than Non-Wilderness Counties. Total payroll in Wilderness Counties was also estimated to be $37,500 less than in Non-Wilderness Counties. County Tax Receipts in Wilderness Counties was estimated to be $92,910 dollars less than in Non-Wilderness Counties *(id*.).

The Forest Revision Plan should protect the customs and culture of the area it is affecting. The customs and cultures of hunting, fishing, camping, wood gathering, collection of mountain berries and mushrooms is what our National Forest has been used for over the past 150 years. Designating more wilderness will detract from those customs and our culture.

For these reasons, wilderness areas and all such lands designated backcountry, Research natural areas, or wild and scenic rivers, where wise management of the resources are disallowed or discouraged are not desirable.

Citations

Steed, B. et al. 2011. *The Economic Costs of Wilderness*. Issue Brief. Jon M. Huntsman School of Business, Utah State University.

Appendix A:
Baker County Natural Resource Plan

[Please refer to page 16, where we address how the revised Forest Plan is consistent with the Baker County Natural Resource Plan.]

Appendix B:

Wallowa County plan – Utilization Standards for Late Spring/Summer

Allowable Use of Available Forage in Riparian Areas				
Range Resource Management Level	Grass and Grasslike species		Shrubs	
	Satisfactory Condition	Unsatisfactory Condition	Satisfactory Condition	Unsatisfactory Condition
Livestock use managed within current grazing capacity by riding, herding, and salting. Cost effective improvements only to maintain stewardship of range	40	0-30	30	0-25
Livestock managed to achieve full utilization of allocated forage. Management system designed to obtain distribution and maintain plant vigor include fencing and water developments	45	0-35	40	0-30
Livestock managed to optimize forage production and utilization. Cost-effectiveness culture practices improving forage supply forage use and livestock distribution may be combined with fencing and water development to implement complex grazing systems.	50	0-40	50	0-35

Allowable Use of Available Forage in Upland Areas						
Range Resource Management Level	Forest		Grassland		Shrubs	
	Satisfactory Condition	Unsatisfactory Condition	Satisfactory Condition	Unsatisfactory Condition	Satisfactory Condition	Unsatisfactory Condition
Livestock use managed within current grazing capacity by riding, herding, and salting. Cost effective improvements only to maintain stewardship of range	40	0-30	50	0-30	40	0-25
Livestock managed to achieve full utilization of allocated forage. Management system designed to obtain distribution and maintain plant vigor include fencing and water developments	45	0-35	55	0-35	45	0-30
Livestock managed to optimize forage production and utilization. Cost-effectiveness culture practices improving forage supply forage use and livestock distribution may be combined with fencing and water development to implement complex grazing systems.	50	0-40	60	0-40	50	0-35

RECEIVED
AUG 12 2014
UMATILLA COUNTY
RECORDS

THE BOARD OF COMMISSIONERS OF UMATILLA COUNTY

STATE OF OREGON

In the Matter of Blue Mountain Forest Plan Revisions and Draft Environmental Impact Statement	))))	Order No. BCC2014-057

WHEREAS the Blue Mountain National Forests were established in 1904 and 1906, under the provisions of the Act of March 3, 1891 and the Act of June 4, 1897 for the specific purposes of improving and protecting the forests, to secure favorable conditions of water flows, and to furnish a continuous supply of timber;

WHEREAS the Blue Mountain National Forests were created with the support of the local population based upon the assurance to the public that the forest reservations were not in the nature of parks set aside for non-use, but were established solely for the economic reasons set forth in the Acts of 1891 and 1897;

WHEREAS the national forests are required under the National Forest Management Act and the Renewable Resources Planning Acts to develop Land and Resource Management Plans that reflect local conditions and in accordance with the purposes for which the forest reserves were created;

WHEREAS recent management of the national forests have resulted in dramatic social, economic and forest health departures from the assumptions upon which the last Land and Resource Management Plan was based;

WHEREAS the Blue Mountains National Forests Proposed Revised Forest Plan has been issued by the Forest Service as a guide for the future management of natural resources on the Malheur, Umatilla, and Wallowa-Whitman National Forests for the next 10 to 15 years;

WHEREAS the proposed plan and statements include a number of alternatives;

WHEREAS the management strategies proposed in the Blue Mountains National Forests Proposed Revised Land Management Plan and Draft Environmental Impact Statement do not reflect the conditions on the ground or the resulting insect and fire cycles that have been experienced in the past on the Blue Mountain

Forests;

WHEREAS, Umatilla County in cooperation with the Eastern Oregon County Association, retained forest scientists to review the proposed revised land management plan and draft environmental impact statement and to thoroughly vet the scientific foundations of the documents;

WHEREAS Umatilla County has reviewed both the results of the science analysis and the proposed plan and finds that the plan inadequately addresses the real and urgent needs of both the natural resource and surrounding communities, is based upon unvalidated scientific theories, is unduly influenced by political pressure, and fails to implement the primary purposes for which the Blue Mountain Forests were established.

NOW THEREFORE, the Umatilla County Board of Commissioners find all alternatives in the Blue Mountains National Forests Proposed Revised Land Management Plan and Draft Environmental Impact Statement to be unfounded and requests that the Forest Service abandon all the Alternatives and reassess the conditions on the ground and develop a range of alternatives that address these conditions focusing on the need to improve and protect the forests, to secure favorable conditions of water flows, and to furnish a continuous supply of timber.

DATED this 12th day of August, 2014.

UMATILLA COUNTY BOARD OF COMMISSIONERS

William J. Elfering, Chair

ABSENT

George M. Murdock, Commissioner

W. Lawrence Givens, Commissioner

BOARD OF COMMISSIONERS UMATILLA COUNTY STATE OF OREGON

ATTEST:
OFFICE OF COUNTY RECORDS

Mary Closer

Records Officer

IN THE COUNTY COURT FOR THE STATE OF OREGON
FOR THE COUNTY OF MORROW

IN THE MATTER OF THE BLUE MOUNTAINS NATIONAL FORESTS PROPOSED REVISED LAND MANAGEMENT PLAN AND DRAFT ENVIRONMENTAL IMPACT STATEMENT	)))))	COUNTY RESOLUTION No. R-2014-13

WHEREAS, the Blue Mountain National Forests were established in 1904 and 1906, under the provisions of the Act of March 3, 1891 and the Act of June 4, 1897 for the specific purposes of improving and protecting the forests, to secure favorable conditions of water flows, and, to furnish a continuous supply of timber; and,

WHEREAS, the Blue Mountain National Forests were created with the support of the local population based upon the assurance to the public that the forest reservations were not in the nature of parks set aside for nonuse, but were established solely for the economic reasons set forth in the Acts of 1891 and 1897;

WHEREAS, in recognition that the burdens placed upon county governments as a result of the creation of the national forest reserves should be shared by the nation, Congress directed that the receipts generated from the national forest system, and whereas, the national forests within its boundaries are the economic, recreational, social and cultural foundation of Morrow County; and

WHEREAS, the national forests are required under the National Forest Management Act and the Renewable Resources Planning Acts, to develop Land and Resource Management Plans that reflect local conditions and in accordance with the purposes for which the forest reserves were created; and

WHEREAS, recent management of the national forests within Morrow County has resulted in dramatic social, economic and forest health departures from the assumptions upon which the last Land and Resource Management Plan was based; and,

WHEREAS, the departures from the Land and Resource Management Plan have been primarily the result of changing political theories rather than to reflect the changing forest conditions resulting from both natural and man-made disturbances;

WHEREAS, the management strategies proposed in the Blue Mountains National Forests Proposed Revised Land Management Plan and Draft Environmental Impact Statement do not reflect the conditions on the ground or the resulting insect and fire cycles that have been experienced in the past on the Blue Mountain Forests;

WHEREAS, Morrow County in cooperation with the Eastern Oregon County Association retained forest scientists to review the proposed revised land management plan and draft environmental impact statement and to thoroughly vet the scientific foundations of the documents;

WHEREAS, Morrow County has reviewed both the results of the science analysis and the proposed plan and finds that the plan inadequately addresses the real and urgent needs of both the natural resource and surrounding communities; is based upon unvalidated scientific theories; is unduly influenced by political pressure; and, fails to conform with the primary purposes for which the Blue Mountain Forests were established.

THEREFORE BE IT HEREBY RESOLVED that the Morrow County Court finds all alternatives to be unfounded and requests that the Forest Service abandon all the Alternatives and reassess the conditions on the ground and develop a range of alternatives that address the on the ground conditions focusing on the need to improve and protect the forests; to secure favorable conditions of water flows; and, to furnish a continuous supply of timber.

DATED this 13th day of August, 2014.

MORROW COUNTY COURT:

Terry K. Tallman, Judge — Date 8/13/2014

Ken Grieb, Commissioner — Date 8/13/14

Leann Rea, Commissioner — Date 8/13/14

ATTEST:

Bobbi Childers by Theresa Crawford Deputy Clerk
Bobbi Childers
County Clerk

COUNTY COURT * STATE OF OREGON 1885 * MORROW COUNTY

MORROW COUNTY

COUNTY COURT

P. O. Box 788 · Heppner, Oregon 97836
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LEANN REA, Commissioner
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Heppner, Oregon
KEN GRIEB, Commissioner
email: kgrieb@co.morrow.or.us
Heppner, Oregon

August 13, 2014

Ms. Sabrina Stadler
Blue Mountains Plan Revision Team
P.O. Box 907
Baker City, OR 97814

Dear Ms. Stadler,

Morrow County appreciates this opportunity to comment on the Blue Mountains National Forests Proposed Revised Land Management Plan and Draft Environmental Impact Statement ("BMPR").

We are aware of the positive things happening such as the region's Eastside Restoration Strategy, the Southern Blues Collaborative Forest Landscape Restoration Project on the Malheur, and other collaborative group activities. These recent efforts are encouraging and we will do everything possible to help them succeed.

However, the pace to agree and implement this plan has been dreadfully slow. Access is being reduced or prevented, and the cutting of these trees is limited - impacting economic, social, recreational and community benefits in Morrow County. Finally, and most sadly, this natural resource is left to bum and decay as its highest/best use.

We conclude the alternatives do not adequately address moving to solution and a plan must be rewritten as sited in the attached 23 page comment letter.

Time and talk, proposed rules and regulations and process are being substituted for genuine purpose, management and action.

Morrow County respectfully submits these comments for consideration.

Sincerely,

Judge Terry K. Tallman | Commissioner Ken Grieb | Commissioner Leann Rea

[NOTE: The letter that follows from Eastern Oregon County was also attached to this letter.]

Eastern Oregon Counties Association

Baker Deschutes Gilliam Grant Harney Malheur Morrow Sherman Umatilla Union Wallowa

August 6, 2014

Ms. Sabrina Stadler
Blue Mountains Plan Revision Team
P.O. Box 907
Baker City, OR 97814

Dear Ms. Stadler:

We appreciate this opportunity to comment on the Blue Mountains National Forests Proposed Revised Land Management Plan and Draft Environmental Impact Statement ("BMPR"). The Eastern Oregon County Association (EOCA) is an organization of eleven eastern Oregon county governments. Our members are the elected representatives of the citizens of the region most directly affected by the decisions that are being made about the national forests in this plan revision. Our comments are submitted by the Association on behalf of the individual county governments and our citizens. They are applicable to all three national forests, unless otherwise noted.

Many of our member counties have been working with the Planning Team, as Cooperating agencies, since the very beginning of the BMPR process ten years ago. The eastern Oregon economy is largely resource-dependent and relies on access and productivity associated with public lands that dominate our landscape. Our communities are tied to the land culturally and economically. Our future economic and social well-being is dependent on wise stewardship of these lands. Thus, we have an enormous stake in the future of the three Blue Mountain national forests.

GENERAL COMMENTS

The Pace of Restoration

There are signs of good things happening on the ground in the national forests today such as the region's Eastside Restoration Strategy, the Southern Blues Collaborative Forest Landscape Restoration Project on the Malheur, and other collaborative group activities. These efforts recognize that these forests desperately need active management, at the landscape scale, to restore ecological resiliency and ensure the social and economic vitality of eastside communities. These recent efforts are encouraging and we will do everything possible to help them succeed.

Although we have been involved in the shaping of the proposed plan revision over the past decade, as we have communicated repeatedly, we continue to believe strongly that

the proposed plan inadequately addresses the real and urgent needs of both the natural resource and surrounding communities. The plan is constrained by too much of a "more

of the same" approach to management where the land base available for active, restorative management is whittled down by almost endless exceptions, withdrawals, and prohibitions.

There are urgent ecological, social, and economic needs to dramatically accelerate the pace of forest restoration activities. We must learn the lessons from Arizona and Colorado, as well as from closer to home, of the consequences of inaction before we too lose both the resource and the benefits it provides to our economy and communities. This is the single, overarching concern that we have with the proposed plan.

The poor health condition and high fire susceptibility of the forests is well known, but a couple of comments from the planning documents highlight the problems:

- *"Based on forest inventory and the forest vegetation simulator fire/fuels modeling, 40 to 60 percent of the dry upland forest now has the potential for high severity fire as a result of the abundance of multi-storied stands with high stocking levels." - Plan Doc, p. 34.*

- *"Recent plan modeling of the potential mortality from disturbances from insects and disease indicates that approximately 30 percent of the forest stands in the Blue Mountains have the potential to have more than 25 percent of their total volume killed in the next 10 years" - Plan Doc, p. 35.*

The perpetuation of these conditions threatens the achievement of virtually every Desired Condition in the plan.

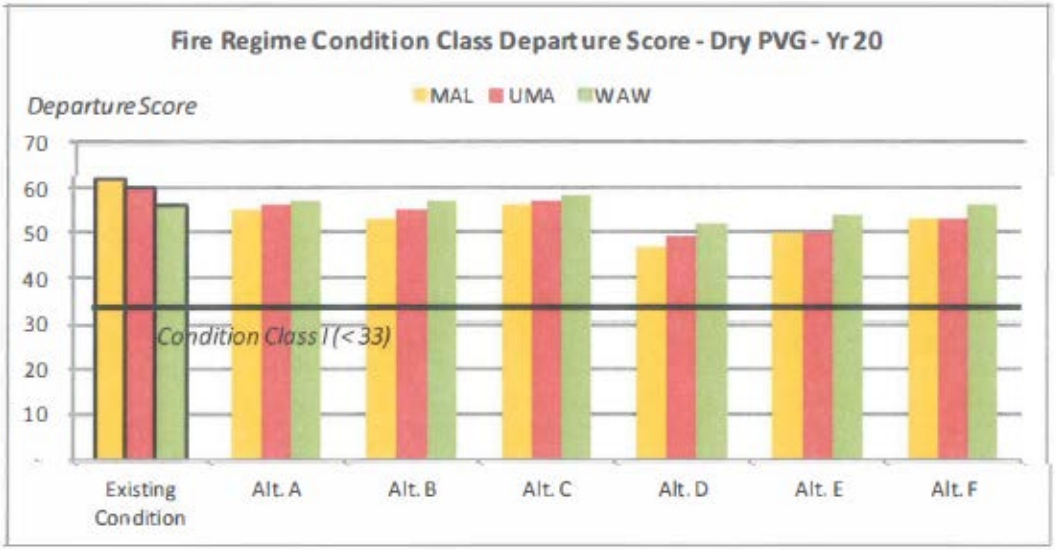
The lack of progress in reaching critical Desired Conditions via any of the Alternatives is a pervasive problem throughout the analysis, indicating to us none of the Alternatives are sufficient in addressing the issues identified in the scoping process. The evidence presented within the planning document itself supports this conclusion.

As one example, consider the Desired Condition relating to fire regime condition classes. The desired condition is, "in landscapes that exhibit a moderate or high degree of departure (Condition Class II or Ill), the degree of departure is decreased to low or moderate (Condition Class I or II)." The following two charts use data from Table 114 (Vol. 1, p. 218) to illustrate the lack of timely progress in achieving this Desired Condition for the critical dry upland forests under all Alternatives - after 20 and even after 50 years.

The existing condition on each of the forests is "moderately departed" which is defined as departure scores between 33 and 66. Across all forests, the average departure score is 59. The Desired Condition is to get the departure score below 33 over time, moving the acreage from moderate to low departure (Condition Class II to Condition Class I).

Fire Regime Condition Class departure scores within dry upland forest PVG, Yr 20

Forest	Existing Condition	FRCC Departure Score - YEAR 20 (GOAL: < 33)					
		Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F
MAL	62	55	53	56	47	50	53
UMA	60	56	55	57	49	50	53
WAW	56	57	57	58	52	54	56
AVERAGE	**59**	**56**	**55**	**57**	**49**	**51**	**54**
Avg % Progress to Goal		13%	16%	9%	38%	30%	20%



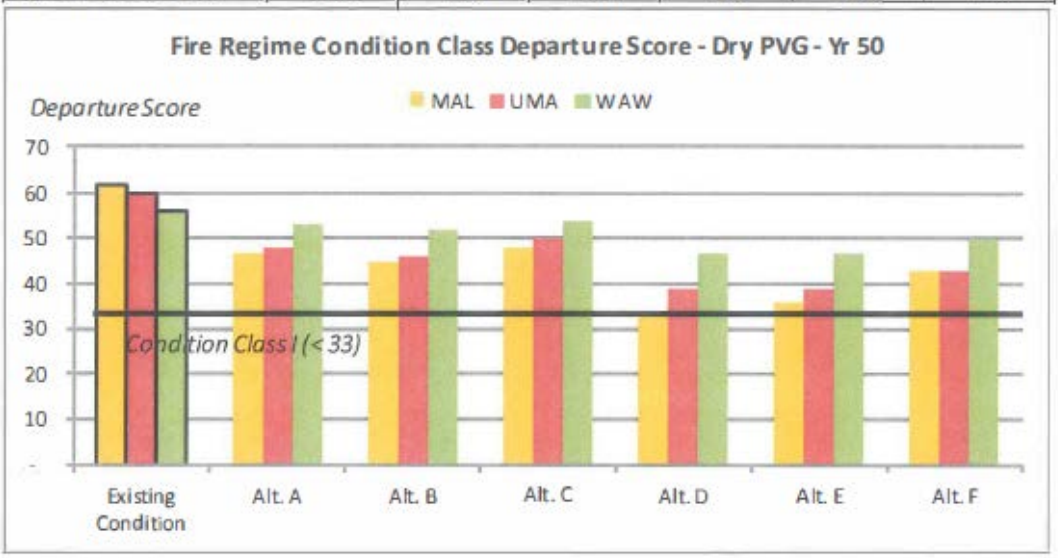
After 20 years, the Alternatives result in only modest, at best, movement towards this goal. Alt. D makes the most progress, moving the average departure score from 59 to 49. This 10 point movement represents only a 38% achievement of the goal of getting departure scores below 33. The preferred alternative, Alt. E, makes less than one-third of the progress needed. All forests continue to be classified as "moderately departed." This means that, twenty years from now, these forests will be nearly as vulnerable to catastrophic wildfire loss as they are today.

Even after 50 years, progress towards the goal is unacceptable (see chart below). The Desired Condition is met for only one forest (Malheur) under Alt. D. In 50 years, the Preferred Alternative only achieves 71% of the stated goal. As the document itself states, "None of the alternatives would achieve the desired conditions for stand densities at year SO. Under all of the alternatives, the% of the landscape in open forest would remain above the desired condition range at year 50 ." (Vol. 2, Ch. 3, p. 163).

We simply do not have 50 -100 years to return our forests to a healthy, resilient state. Clearly, more proactive, aggressive approach is needed than has been identified in any of the alternatives presented.

Fire Regime Condition Class departure scores within dry upland forest PVG, Yr 50

Forest	Existing Condition	FRCC Departure Score - YEAR 50 (GOAL: < 33)					
		Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F
MAL	62	47	45	48	33	36	43
UMA	60	48	46	50	39	39	43
WAW	56	53	52	54	47	47	50
AVERAGE	**59**	**49**	**48**	**51**	**40**	**41**	**45**
Avg % Progress to Goal		38%	44%	33%	75%	71%	53%



The primary reason for the lack of progress in achieving Desired Conditions is the lack of active management. This is the result of two factors: (1) allocation of land to Management Areas in which active management is prohibited, or at best severely constrained, and {2) budget constraints used in the development of alternatives.

Under the Preferred Alternative, annual active forest restoration activities occur on only 2.6% of the general forest area (MA4) annually. More relevant, is that active management - including harvest, planting, non-commercial thinning, and fuels management - occurs on only 1.5% of the entire 4.9 million acre land base annually. It is no wonder that so little progress is made given the low level of active management envisioned under this proposed plan.

The slow pace of restoration envisioned in the alternatives also ignores the likelihood that re-treatment in some form will be needed on a cycle of between 20 and 30 years. Realistically, between 3.5 and 5.0 percent of the landscape should be treated annually to maintain landscapes at the desired densities, harvesting every 20 to 30 years. This is to maintain landscapes at acceptable densities once they are achieved. Only Alt. D comes close to the bottom end of the range needed to successfully manage stand densities within the desired range. In reality, we should be treating more than 5 percent in order to eliminate the large accumulation of overstocked stands.

A comparison of planned harvest levels with annual growth provides another example of the low level of management under all of the Alternatives and also raises questions about the ability to achieve many of the most critical Desired Conditions related to forest health and resiliency.

The three national forests currently carry an inventory of 45 billion board feet (Bbf) (Vol. 2, Ch. 3, p. 101} and annual gross growth of 1.3 Bbf. Mortality is estimated at 500 million board feet (MMbf) or 38% of gross growth. This leaves net growth of 800 MMbf annually across all acres. Net annual growth on the Acres Suitable for Timber Production is estimated at 207 - 469 MM bf, depending on Alternative, as shown in the table below.

Tables 294 - 296. Timber Sale Program Quantities

	Timber Sale Program Quantity (Million Board Feet Annually)						
National Forest	Current	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F
Malheur	30	30	31	16	87	56	37
Umatilla	27	27	29	16	76	56	36
Wallowa-Whitman	24	24	27	15	80	50	34
Total	81	81	87	47	243	162	107

Table 297. Annual harvest as a percentage of annual growth.

	Annual Harvest as a percentage of annual growth						
National Forest	Current	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F
Malheur		23%	24%	18%	48%	43%	29%
Umatilla		39%	38%	34%	69%	74%	47%
Wallowa-Whitman		18%	22%	21%	45%	41%	28%

Annual net growth calculated from above tables

	Calculated Net Growth						
National Forest	Current	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F
Malheur		130	129	89	181	130	128
Umatilla		69	76	47	110	76	77
Wallowa-Whitman		133	123	71	178	122	121
Total		333	328	207	469	328	326
Overall TSPQ as % of net growth		24%	27%	23%	52%	49%	33%

Recent harvest levels (2007-2009) have averaged 72 MMbf across all three forests; 44 MM bf counting only sawtimber products (Table 40, Vol. 1, Ch. 3, p. 98}. The Timber Sale Program Quantity (TSPQ) under the Alternatives range from 47 to 243 MMbf. The Preferred Alternative proposes a TSPQ of 162 MM bf, representing less than half the net growth on the acres suitable for timber production and only 20 percent of net growth over all acres. Alt. D, in spite of its higher TSPQ, still only harvests 52 percent the net growth on the acres suitable for timber production under this alternative.

The implications of harvesting far under growth are clear. Biomass will continue to accumulate and the forest, overall, will grow more overstocked, not less. As stated in the Environmental Consequences section,

> "[t]he consequences of not harvesting or reducing biomass by fire would be an increased risk of mortality from uncharacteristic wildfire, insects, and disease. The increased would be primarily due to growth exceeding mortality (from insects and disease and fire), making it difficult to achieve desired stand densities." (Vol. 2, Ch. 3, p. 172).

Given this, it is difficult to understand how any of the Alternatives can make progress toward the desired conditions that relate to lower stand densities. It calls into question even the modest improvements in fire regime condition class departure scores described above. We don't see how progress is being made in improving fire resiliency if biomass accumulations persist.

It could be that the VDDT model, which we understand has a probabilistic wildfire component, is predicting large increases in catastrophic wildfires, and insect/disease outbreaks that is setting stands back to earlier structural stages. If so, this environmental, social, and economic impact is not adequately disclosed or analyzed in the DEIS and as a result, the public is being mislead about the consequences of the alternatives.

We ask that the Planning Team take a look at this question and provide an explanation that satisfactorily addresses this issue.

<u>Departure from Non-declining Flow Policy is Warranted and an Analysis is Required</u>

In order to significantly accelerate the pace of forest restoration, the agency should and we argue they must - analyze an alternative that considers a departure from agency's policy of nondeclining flow (NDF) of timber harvest. The nondeclining flow policy is a key component of the 1982 Planning Rule. Section 219.16 states,

> "for the base sale schedules, the planned sale for any future decade shall be equal to or greater than, the planned sale for the preceding decade, provided that the planned sale is not greater than the long-term sustained-yield capacity consistent with the management objectives of the alternative."

The planning rule states that "Alternatives with sale schedules which depart from the principles of [nondeclining flow] and which will lead to a better attaining of the overall objectives of multiple-use management **<u>shall be evaluated</u>** when any of the following conditions are indicated:

(i) None of the other alternatives considered provides a sale schedule that achieves the assigned goals of the RPA Program as provided in Sec. 219.4(b);

(ii) High mortality losses from any cause can be significantly reduced or prevented or forest age-class distribution can be improved, thereby facilitating future sustained-yield management; or

(iii) Implementation of the corresponding base sale schedule would cause a substantial adverse impact upon a community in the economic area in which the forest is located.

(iv) It is reasonable to expect that overall multiple-use objectives would otherwise be better attained."

However, as explained on p. 350 of Appendix B, the agency has not identified a need for considering a departure:

> "the base schedule is a timber sale schedule formulated on the basis that the quantity of timber planned for sale and harvest for any future decade is equal to or greater than the planned sale and harvest for the preceding decade, and that this planned sale and harvest for any decade is not greater than the long-term sustained yield capacity ... This definition expresses the principle of nondeclining flow. ... the first decade allowable sale quantity must meet the nondeclining flow requirements unless departure from the base schedule is determined to be warranted. *The need for considering departures has not been identified at this time ... "*

Given the poor condition of the resource outlined by the plan, we find it very difficult to believe that the agency has appropriately analyzed this issue as required by the planning rule. It is clearly evident that conditions ii, iii, and iv listed above are, in fact, indicated and therefore, the Forest Service not only should, but must, evaluate at least one Alternative that considers a departure from NDF.

- First, an accelerated restoration program that goes beyond the limitations imposed by NDF could significantly reduce mortality losses from fire, insects, and disease. Condition ii is met. The plan clearly outlines the problem in multiple places; for instance:

"Recent plan modeling of the potential mortality from disturbances from insects and disease indicates that approximately 30 percent of the forest stands in the Blue Mountains have the potential to have more than 25 percent of their total volume killed in the next 10 years" - Plan Doc, p. 35.

"[t]he consequences of not harvesting or reducing biomass by fire would be an increased risk of mortality from uncharacteristic wildfire, insects, and disease. The increased would be primarily due to growth exceeding mortality (from insects and disease and fire), making it difficult to achieve desired stand densities." {Vol. 2, Ch. 3, p. 172).

- Secondly, a departure can avoid substantial adverse impacts upon the local community that will otherwise result from further closure of local mills and loss of infrastructure and jobs. Condition iii is met. As we will show later, the regional infrastructure cannot be maintained at the levels of harvests proposed under any of the alternatives. This will have a substantial adverse impact upon a community in the economic area in which the forest is located.

- Thirdly, it is reasonable to expect that overall multiple-use objectives would be better attained. It has been clearly shown that the current Alternatives, including the preferred alternative fail to achieve the major desired conditions (the current terminology for "multiple use objectives") within any sort of reasonable time frame. Condition iv is met.

Thus, according to the 1982 Rule, the Forest Service must consider a departure from NDF in the Blue Mountain Plan Revision. Yet, it hasn't.

Furthermore, the agency, in not considering a departure, is being inconsistent with plan revision efforts in at least one other region. Northern Region forests are incorporating consideration of a departure from nondeclining flow in their plan revisions, including the Clearwater-Nez Perce NF in ldaho.[23] The rationale for this is the urgent need to "kick-start" forest restoration efforts.

A departure from nondeclining flow is in fact warranted. Such a departure is consistent with the urgent need to thin forests and achieve forest health-related Desired Conditions within a reasonable time frame of 20 to 25 years instead of 50 to 100 years under the preferred alternative. This would allow harvest levels to increase temporarily under an accelerated restoration strategy and decline in future decades once the forests have reached Desired Conditions.

The departure analysis must be completed in conjunction with an alternative that is not bound by budget constraints (see below). Our understanding is that because of budget assumptions, Alternative D is the only alternative, where the NDF policy is constraining timber production levels. In other cases, budget constraints are hit first.

[23] Proposed Action for the Forest Plan Revision, Nez Perce-Clearwater National Forests. July 2014.

Budget-Constrained Alternatives in Violation of Planning Rule

All of the alternatives, except Alt. D, are constrained by current/expected budgets or in the case of Alt. E and F, modest increases over existing budget levels. We believe this is counter to the direction of the 1982 Planning Rule which states that,

> "Alternatives shall be distributed between the minimum resource potential and the maximum resource potential to reflect to the extent practical **the full range** of major commodity and environmental resource uses and values that could be produced from the forest. ***Alternative shall reflect a range of resource outputs and expenditure levels."*** [emphasis added]

In constraining the alternatives to a narrow range of expenditure levels, the agency has failed to meet the requirement of the Planning Rule to investigate a full range of uses and values and reflect a range of outputs and expenditure levels.

It is worth noting that forests in the Northern Region have been directed to analyze each alternative with and without budget constraints so that the needs of the resource can be adequately represented. To quote the Nez Perce-Clearwater Proposed Action, "this will allow for analysis to display the ecological and socioeconomic effects of a range of harvest levels, while also disclosing the funding levels needed to best meet desired conditions across the plan area. "[24]

To correct this, we request that the agency analyze each alternative with and without budget constraints. Without such an analysis, the agency decision-makers and the public cannot be adequately informed about the resource trade-offs and other impacts of the decisions that are being made.

We also point out that the proposed plan and accompanying analysis fails to meet a number of other requirements of the 1982 Planning Rule, including but not limited to the following:

- Monetary benchmarks which estimate the maximum net present value of those resources that have an established market value ...

- Demonstration that the alternatives represent the most cost efficient combination of management prescriptions examined that can meet the objectives established in the alternative.

- Identification of the alternative that comes nearest to maximizing net public benefits.

[24] Proposed Action for the Forest Plan Revision, Nez Perce-Clearwater National Forests. July 2014.

Access

Access to national forest lands is a right of every American citizen and is highly valued by our constituents, many of whom are third and fourth generation eastern Oregonians with a deep heritage and cultural ties to the federal forestlands. Maintaining access to the land for a variety of purposes is a primary concern.

The plan documents are quick to point out all kinds of real and perceived problems caused by roads. It fails to provide an objective, balanced discussion by also pointing out the many benefits of a well-planned and maintained road system. If roads are in poor condition it is because of the collapse of the timber sale program that used to provide the funds to maintain them. Spending scarce taxpayer dollars to obliterate roads, when there are so many more pressing and obvious resource restoration needs makes no sense.

We are concerned that the proposed plan, while it may not in itself close or decommission a road, does in fact set the table for widespread road/trail closures and decommissionings in the future. These must not be done in a vacuum. Public participation and collaboration with local elected representatives is essential.

H.R. 4272, introduced in the House by Congressman Greg Walden would require the Forest Service to consult with and obtain concurrence from each affected county on proposed travel management actions affecting motorized or non-motorized access to National Forest System lands. This includes actions such as the decommissioning of roads and trails, a change in the status of a road as open or closed, or a change in forest road densities.

The Forest Service should follow the lead of this legislation and build an open, transparent, and participative public process around travel management. County governments should be consulted and agreements should be required. We ask the agency to modify the Alternatives to reflect this approach to access-related issues.

Grazing

We are very concerned over the impact of the plan's directions, standards, and guidelines on cattle and sheep grazing. The underlying premise seems to be that all grazing is bad and the more there is, the worse conditions get. We disagree and point to many examples where range conditions have improved over the last 20+ years through improved practices rather than elimination of grazing.

Some of the claims and statements about the current grazing situation just don't pass the sniff-test. For example, in the Analysis of the Management Situation, it is stated that "grazing on national forest lands directly provide about three percent of the forage needs of the local cattle inventory" (p. 148). The total grazing land within the plan area

is approximately 3,395,000 acres (Vol. 1, p. 135). If this area is only providing 3% of local forage needs, then it is quite obviously wildly under-utilized. The figure implies that over 113 million acres of similar lands, grazed at the same level of intensity, would be required to provide all of the local cattle inventory's forage needs (3,395,000 + 0.03 = 113,166,667 acres). This is almost twice the size of the entire State of Oregon!

This statement either needs to be corrected or the agency needs to provide an explanation of how the 3% figure was arrived at. As is, it gives the uninformed public the misleading impression that grazing on national forest lands is an insignificant use that could be easily eliminated.

The presentation and analysis of the grazing issue and environmental impacts is very confusing to say the least. For example, we believe that the impact of the lower (25%) utilization standards in riparian areas with bull trout spawning and rearing reaches under Alt. E - and anadromous fish reaches under Alt. F - on livestock grazing could be very significant but the analysis seems to show no impact at all.

The stricter guidelines in Alt. E and F would apply to 53 subwatersheds containing bull trout (640,000 acres, 36% of forest area) and 88 watersheds inhabited by anadromous fish (905,000 acres, 50% of forest area) (Vol. 1, p. 309). Yet, the permitted cattle AUMs for Alt. E and F are the same as Alt. A for all 3 forests.

- How can this be if Alt. E and F have lower utilization standards in riparian areas across 36% to 50% of the forest as compared to Alt. A?

- How can Alt. F have the same cattle AUMs as Alt. E if it has the additional low utilization standards on anadromous fish reaches as well as bull trout reaches?

Cattle AUMs for Alt. C are said to decrease due to riparian buffers being designated as unsuitable for grazing. Alt. D has higher cattle AUMs due to smaller riparian buffers. Yet, the change in utilization within bull trout and anadromous fish reaches under Alt. E and F have no effect on cattle AUMs. How can this be?

There are also inconsistencies in the descriptions of the alternatives relative to riparian grazing standards, particularly between Alt. E and F. The description of Alt. E on Vol. 1 p. 38 states that utilization guidelines place additional limits on grazing in subwatersheds with bull trout and anadromous fish reaches. The description of Alt. Fon p. 40 says the same riparian grazing proposals are made for Alt. E and F. The text on p. 309 (Vol. 1) also indicates that the stricter restrictions apply to both bull trout and anadromous fish reaches in both Alt. E and F. However, elsewhere in the document, the guidelines differ between Alt. E and F. Table 83, (Vol. 1, p. 134) shows different guidelines for maximum utilization within riparian management areas for Alt. E and F. The 25% utilization guideline for Alt. E is only applicable to bull trout reaches; the standard for other watercourses including anadromous fish reaches is 40%. Alt. F has different utilization standards

including 30% in bull trout reaches and 35% in anadromous fish reaches. The table accompanying Guideline G-115 for the preferred alternative (Alt. E) on page 141 of the Proposed Plan has yet a different set of utilization standards than is shown for Alt. E in Table 83. Further, the Guideline G-115 on page 141 differs from the Guideline G-115 for Alt. E on page 299 of Vol. 3. This version also shows that the lower utilization standard only applies to bull trout reaches, not anadromous fish reaches. Which is the Forest Service proposing? How can the public make any sense out of this?

The obvious inconsistencies and lack of adequate explanation do not provide us with any reason to believe this issue has been correctly analyzed.

The lack of clarity extends into the socio-economic analysis of grazing. The estimated employment contribution from Range (# of jobs) increases between Alt. A and Alt. E on the Malheur (Vol. 1, Table 58, p. 114} even though AUMs for cattle and sheep are exactly the same in each Alternative (Vol. 1, Table 57, p. 113}. On the Wallowa, AUMs are the same between Alt. A and E and the number of jobs are the same as well. We find these inconsistencies hard to rationalize.

The plan documents also provide inconsistent AUM numbers in different parts of the report. For example, Plan Table 26 (objectives) indicates preferred alternative Objectives of 35,800 AUMs and 80,500 AUMs (cattle and sheep) for the Umatilla and Wallowa-Whitman, forest respectively. However, Table 57 (Vol. 1, p. 113} shows totals of 34,600 and 81,500 AUMs for the same forests under Alt. E. It is also not clear how many AUMs the forests are currently providing so it is hard to determine the impacts of the alternatives. Different "current" numbers are cited in different parts of the documents.

We are also concerned that the ever more restrictive limitations and standards on grazing are not justified. The agency's own analysis of the situation indicates that current standards are working:

> "Measures more restrictive than those of the 1990 forest plans were implemented in 1995 with the intent of protecting, conserving, and managing riparian habitats for protected resident anadromous fish species. Monitoring of the effectiveness of these measures began in 2001 as required by the PACFISH/INFISH biological opinion (PIBO}. To date, repeat PIBO sampling has been completed on more than 200 monitoring reaches in the Blue Mountains ... monitoring information combined with long-term camera point monitoring and professional observation, indicated that there has been recovery in many areas for many of the parameters most closely associated with livestock grazing effects ... " (Vol. 1, p. 135)

The analysis goes on to point out that improvement has not occurred at all sites or for all parameters but, "at the scale of the Blue Mountains, favorable trends have been observed in 18 of 24 aquatic and riparian habitat variables measured at managed sites ... " (Vol. 1, p. 135) and, "with specific areas of concern remaining, many riparian areas and wetlands have improved relative to reference conditions (and relative to the early 1990s). It is believed that recovery is continuing at a relatively slow but steady rate" (Vol. 1, p.136).

If the current standards and management practices under PIBO are working, what is the justification for imposing stricter grazing standards now? If the agency is concerned about the relatively slow pace of improvement in this case, why is it so seemingly so unconcerned about the slow pace of forest restoration, which is a much more substantial and urgent issue?

The 40% utilization standard seems to be based on Holechek et al. (2006). This paper is based on arid and semi-arid lands and is not an appropriate scientific basis for these forests. It is not "best science." The current 45% utilization standard should be maintained without a clear scientific rationale, based on relevant local research, for reducing the standard.

We could find no scientific justification for the 25% utilization standard in riparian areas. What is the scientific basis for asserting this standard? We believe the standard may be so low that grazing will become uneconomic and grazing numbers will fall far more than is characterized in the analysis.

According to a BLM paper by E. Crowley (2002) titled, "Guidelines for Establishing Allowable Levels of Streambank Alteration," the science around the relationship between streambank alteration and stability is not well-established and few guidelines exist that establish the amount of streambank alteration a stream can tolerate. Greenline, woody species regeneration, and stubble height or utilization are the typical monitoring methods. Research has established some utilization and stubble height criteria.

"Managing Grazing of Riparian Areas in the lntermountain Region" (lntermountain Research Station GTR-INT-263, 1989) is a guidance document for planning riparian procedures on national forests in the lntermountain Region but says it is applicable to other regions as well. In summary, it says that the level of utilization on a site, including riparian areas, is the most important consideration. To achieve protection, the report recommends a minimum herbage stubble height at the end of the growing season of 4-6 inches in height. Special situations such as critical fisheries habitat might require stubble heights of greater than 6 inches. It goes on to recommend maximum utilization of 65% in the spring, 40-50% in summer, and 30% in the fall. These recommendations seem to generally support a higher maximum utilization than the 40% guideline in the DEIS.

The same report also says that an inventory of 250 miles of national forest riparian areas, no single grazing strategy (guideline) was found to be effective in every riparian situation. So, one could easily argue that these guidelines should be interpreted as flexible guides, not fixed standards, and applied with site specific characteristics in mind.

Another Forest Service report (PNW-GTR-362, 1995) suggests "warning signs" for riparian grazing that allow higher utilization. This report suggests a 3-inch stubble height for "the most palatable species" as a warning sign, with 3/4-inch stubble height or drying of the vegetation as a second warning sign upon which the livestock should be removed. This would seem to indicate that the DEIS guidelines might be excessive.

In sum, EOCA suggests that the FS needs to provide a better scientific basis for the utilization standards proposed in the alternatives.

Relative to sheep grazing standards in relation to bighorn sheep, we have the following concerns. On Vol. 1, p. 144, after citing various studies, the document states, " it is recommended that site-specific solutions for each bighorn sheep population and domestic sheep allotment be developed based on a management strategy appropriate for the complexity of the situation." Further, it states that each of the alternatives takes this approach.

Despite this, all of the Alternatives impose eight new guidelines (RNG-12 - RNG-19) that impose a number of onerous new requirements on permittees in addition to current protections. Some of the new Guidelines are vague - RNG-17 requires that domestic sheep and goats be individual marked in a manner that allows immediate identification "at a distance." How is "at a distance" defined? Do they need to be identifiable from a mile away, from an airplane? How will such unclear language be interpreted in a court case?

While we appreciate that these are Guidelines rather than Standards, and thus allow for some flexibility, overall this approach seems to violate the recommendation for "site-specific solutions." Rather than imposing these guidelines at the forest plan level, we suggest that they be alternative solutions considered as individual allotments are reviewed.

Insufficient Evaluation of Social Effects

The evaluation of consequences to Social and Economic Contributions to Well-Being (Issue 2) is described as follows: "The evaluation of effects focuses on the economic contribution of the alternatives on local economies, the effect of changes in management activities on goods and services, and the resulting impacts on users and their values." However, the last point is not fully addressed by the key indicators of jobs, income, and harvest levels that come out of this section, nor by the discussion of impacts to non market values.

This section includes a discussion of effects on Social Values, but the selected resource and socioeconomic indicators used to compare the alternatives are inappropriate for the types of social issues raised repeatedly by the Counties (e.g., poverty, drug and alcohol abuse, crime, domestic violence), or values related to living in cohesive rural communities. It seems likely that these issues would have also been raised during the public scoping process and may be glossed over due to how public comments were coded. The work by James Kent and Associates is the source of the identification of Social Values. They grouped 1,700 public comments into 10 value types, including economic values and cultural values. Unfortunately, no information is provided as to the content of those comments; only a count by type is provided.

While it's understandable that a coding/grouping process would be used to capture public comments, we are concerned that the process used in this instance has obscured comments related to the values attached to the culture of the local communities the forests support.

As such, the indicators identified to evaluate impacts to cultural values seem inadequate to capture the variety of cultural values that were likely expressed. Alternative impacts on these values are described using the percent of the national forest available for summer motor vehicle use (Table 71) and acres of vegetation management activities for fuel treatments and timber harvest (Table 72). Motor vehicle access is used because gathering food, firewood and other supplies and reaching important places are facilitated by access. Acres of vegetation management are used because firewood gathering is often a side product of vegetation management activities. Vegetation management also often enhances habitat for large vertebrate species, such as deer and elk.

While access is certainly a critical issue, it seems likely that measuring motor vehicle use and vegetation management does not reflect the full spectrum of cultural values that were likely intended by the comments. We know that residents value "communities which are relatively safe and family-oriented" (James Kent and Associates 2006) but consequences for these types of cultural values are not discussed. Effects to other cultural values deserve consideration as well in the evaluation of alternatives. Unfortunately, effects on community cultural values are not being appropriately measured by the selected indicators.

Cumulative Effects – Socio-Economic Analysis

Three statements are made regarding cumulative effects on mill infrastructure and employment within the three socio-economic impact zones:

- Malheur - *"The higher levels of timber harvest and resulting employment under alternative D and E may be enough to support existing and possibly expand wood manufacturing infrastructure."* Vol. 1, Page 122.

- Umatilla - (re alternatives D and E) - *"The increase in timber harvest can contribute to the maintenance and expansion of wood products manufacturing infrastructure."* Page 123.

- Wallowa-Whitman (re: alternative D, nothing about E)- "The increase in timber harvest can contribute to the maintenance and expansion of wood products manufacturing infrastructure." Page 124.

The CEQ defined a cumulative effect as "an impact on the environment which results from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal and non-Federal) or person undertakes such other actions" (40 CFR 1508. 7).

The Ninth Circuit has established that a cumulative effects analysis (CEA} must include detailed information; a clear analysis of effects on resources, not just a description of actions; and an explanation of the rationale behind the conclusions in a CEA.[25] "General statements about 'possible' effects and 'some risk' do not constitute a 'hard look' absent a justification regarding why more definitive information could not be provided."[26] The fact that the DEIS just says levels of timber harvest "may be enough" and "can contribute" does not sound to us like a "hard look."

Further, these general assertions are unsupported by the facts. The study by Adams and Latta (2007), which is cited in the DEIS at page 122, forecasts significant declines in harvests from forest industry and non-industrial private lands over the next several decades. Under the base case scenario, harvests in eastern Oregon decline to about two-thirds of recent historical levels by 2023. According to the study, the forecasted decline in harvest volume precipitates mill closures, which are concentrated in the Blue Mountain region.

We previously provided the planning team with an estimate that 243 MMbf/year of appropriately sized sawlogs needs to be harvested from the three national forests just to keep the currently operating regional mills running. A 339 MMbf/year supply of sawlogs is needed to support re-opening two idled mills in Grant County.

A recently released study by American Forest Resource Council and Associated Oregon Loggers5[27] provides similar figures showing that 335 MMbf of sawtimber from the three national forests is needed to sustain 10 local mills (including the two idled mills) at 79% of full capacity and 405 MM bf is needed to sustain all mills at full capacity.

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[25] Schultz, 2012. History of the Cumulative Effects Analysis Requirement Under NEPA and Its Interpretation in U.S. Forest Service Case Law.
[26] 9th Circuit Court decision in the Neighbors of Cuddy Mtn. v. U.S. Forest Service (1998).
[27] Forest Sector Infrastructure in Northeast Oregon's Blue Mountains, AFRC & AOL, July 29, 2014.

None of the alternatives comes close to this level of harvest. The Preferred Alternative has a combined TSPQ of just 100 MMbf. According to the AFRC/AOL analysis, this will result in the permanent closure of 5 mills and leave the remaining 5 mills running at just 60% of full capacity.

In case there is a worry that AFRC/AOL is "padding the numbers," both the numbers and the dire consequences of a continuing shortfall of federal timber are echoed in a 2013 report on eastern Oregon primary wood products industry by Larry Swan, USDA Forest Service State & Private Forestry:

> "The consequences of losing primary processing infrastructure, such as sawmills and manufacturers that use processing residuals, are evident in states such as Colorado, New Mexico, Arizona and Utah. The industry practically disappeared by the mid- to late-1990s, and as a consequence it became very difficult to conduct ecosystem restoration and fuels reduction projects of any scale unless heavily subsidized. Tens of millions of public funding have been expended over the last 15 years with limited success to recreate primary processing infrastructure to help manage public and private forest lands. Many critics point to the lack of funding as the primary reason that progress has been so slow. Others note that private capital tends to follow sustainable and consistent supply. Although longer-term contracts have begun to be issued by the Forest Service, indications are that it will take much longer to build an experienced workforce, and for business owners to gain sufficient experience and financial stability to begin to make a minimal impact on the backlog of ecosystem restoration and fuels reduction needs of the region. A similar scenario could unfold rather quickly in some areas of Eastern Oregon."[28]

In our opinion, it is reasonably foreseeable that the industry infrastructure in the Blue Mountains will continue to shrink under all Alternatives given dwindling supplies from private lands and modest increases in harvesting from the three forests. Unsupported statements such as those cited above indicate that the Forest Service has not completed a rigorous analysis and is not taking a hard look at the cumulative social and economic impacts of the plan revision.

[28] Larry Swan, Eastern Oregon Primary Wood Products Processing Facilities and Operations. Working Draft, November 2013. USDA Forest Service State & Private in cooperation with Oregon Business Development Dept.

Cumulative Effects and the BLM Sage Grouse Plan Amendments

The Oregon Sub-Region Greater Sage-Grouse Draft Resource Management Plan Amendment and Environmental Impact Statement is listed in Appendix C as a plan that was considered in the cumulative effects analysis. However, it is not clear how the plan was specifically factored into the analysis of cumulative economic effects. Since the Blue Mountain Forests Plan socio-economic impact zones partially overlap with the primary study area for the Sage-Grouse RMP DEIS, we would expect the EIS to take a hard look at the cumulative economic impacts from implementation of the Sage-Grouse Draft Resource Management Plan Amendment and the Blue Mountain Forest Plan Revision, regardless of how significant the impacts are determined to be.

We are especially concerned that the cumulative effects of the revised forest plans and BLM sage grouse amendments on livestock grazing have not been analyzed

COMMENTS ON THE PREFERRED ALTERNATIVE

We are opposed to the Preferred Alternative (Alt. E) for the following reasons:

(1) Our primary concern with the proposed land management plan revision is that it does not adequately address the magnitude of the forest health issue before us and has not kept pace with the new restoration efforts that are just now getting underway. We are concerned that, as written, the proposed plan could become an impediment to more aggressive, active management that we recognize is needed. It does this by setting aside too many acres under passive management and setting targets for accomplishments that are too low in relation to the need because it is constrained by budgets and "more of the same" thinking. The following points elaborate on the details of our concerns.

(2) In Management Areas 1B and lC, the Preferred Alternative sets aside more than 93,000 acres for possible addition to the existing 760,000 acres of Congressionally-designated Wilderness areas, an expansion of more than 12 percent. Currently, designated Wilderness Areas encompass nearly 16 percent of the Plan Revision project acreage. Including the 217,000 acre Hell's Canyon Wilderness in the HCNRA, the acreage devoted to this single-use jumps to nearly 1 million acres or 18 percent of the area of the Blue Mountain forests. Adding another 93,000 acres raises this above 1 million acres and almost 20 percent of the forests' land base including the HCNRA.

Yet, no justification for this additional withdrawal from multiple-use management to single-use, Wilderness designation is presented. In fact, the analysis completed in 2010 by the planning team argues against these additional designation of Wilderness.

The Wilderness Needs Assessment, summarized in Vol. 3, Appx. F, concluded the following:

- Recreational use in Wilderness Areas accounts for only 8 percent of the overall use of the Blue Mountains, and only 4 percent of the use of the national forest lands in the general vicinity.

- Trend data shows that aging populations and shifts in the type of activities younger people are interested in will result in a 2 to 8 percent increase in demand for activities during the next 15 years. This increase will primarily be in day use from nonwilderness areas.

- Current wilderness areas in the Blue Mountains reach capacity only in specific areas during brief high use periods.

Further, the Analysis of the Management Situation states, "Although social desires exist for more wilderness areas across the Blue Mountains, there is not a social need to designate additional wilderness because the current wilderness areas are not exceeding capacity ... Wilderness use is unlikely to exceed the capacity of the existing wilderness areas and is not likely to result in a need for more wilderness in the next 15 years."

In regard to other reasons for additional Wilderness designation, the Needs Assessment found:

- No recommendations for additional designated wilderness are needed to provide refuge for native species.

- Wilderness designation is not needed for "preservation of landform types and ecosystems."

There is no indication in the documents that the majority, or even a large minority, of public comments supported more Wilderness. The DEIS merely says that there were comments both in favor and against creation of new wilderness areas.

We also point out that there is already 14,600 acres in the Homestead Wilderness Study Area, mostly on BLM lands, that has been sitting in limbo since 1992 awaiting a Congressional decision. Additional land that is set-aside for Congressional action will almost certainly remain in a similar limbo for decades.

For these reasons, we do not support the designation of any area as Preliminary Administratively Recommended Wilderness Area (PARWA) because there is no need for it. Setting aside these lands for possible, eventual Congressional designation as Wilderness eliminates the possibility of active management to restore resilient, healthy forest conditions, manage wildfire and insect/disease outbreaks.

We ask that no acres be included in Management Areas 1A and 1B in the final decision.

(3) For the same reasons, we do not support the designation of Backcountry Motorized and Nonmotorized areas (Management Areas 3A and 3B). Under the Preferred Alternative, this area, totaling 653,400 acres, represents a near tripling of the acres designated as backcountry under the No Action Alternative A. In our opinion, all of the acres within this designation should be returned to General Forest (MA 4A and 4B) because neither Backcountry designation does anything to further the effort to restore the resource to a resilient, healthy condition. Nor does it provide any significant economic or social benefit to the surrounding communities. Instead, it is another hindrance to active management on another 13 percent of the land base.

The Backcountry Nonmotorized designation, MA 3A, totaling 228,200 acres in the Preferred Alternative is especially troublesome. Acres designated as such rise from 77,295 acres under Alt. A to 228,200 acres under Alt. E. Based on the description of the MA and the suitability matrix, this designation is essentially de facto Wilderness, only designated by the agency decision-makers instead of Congress. Although the MA is "suited" for timber harvest it is unclear how any harvest can be done without motorized equipment and with the prohibition against new road construction under the Standards. Standard "MA 3A/B BACK-2 5-59" limits new road construction to that "required for special uses" or to provide access to non-federal lands required by law.

The lack of the Backcountry designation will not diminish the dispersed recreational opportunities that are available on these lands, ranging from semi-primitive to primitive experiences.

We ask that no acres be designated as Backcountry and included in Management Areas 3A and 3B in the final decision.

(4) Management Area 4B - Riparian Management Areas - constitute 792,900 acres, or 16% of the project area. However, in reality, the proportion is much higher because the acreage associated with MA 4B includes only those acres that fall within General Forest (MA 4A). Given that, riparian area management constrains management in 29% of the general forest area.

While we do not question the need for RMAs of some sort, we do question the scientific basis of the riparian buffer widths dictated by the Region's Aquatic and Riparian Conservation Strategy (ARCS). ARCS adopted the buffer widths originally imposed by PACFISH/INFISH which were intended to be interim measures until better science was available. As such, they were very conservative, erring on the side of greater protection of riparian values. These buffer widths were based largely, if not entirely, on the much wetter conditions west of the Cascades.

The 2008 ARCS document provides no scientific rationale or research-based support for these buffer widths either in the westside or in the much drier terrain east of the Cascades. The brief, 2-1/2 page "Scientific Basis" in the ARCS document does not discuss any studies that address the stream buffer widths imposed by the strategy. To our knowledge, ARCS has never been subject to outside peer scientific review or public comment, yet it has become guidance for all national forest planning in the region. All national forest planning efforts are required to adopt the ARCS, including its specific, prescribed wording, into the preferred alternative. In the BMPR, only Alt. D departs from this directive.

Rather than a "one-size-fits-all" strategy, there are clear differences in the riparian ecology and conditions between eastside and westside forests that should be taken into account by the agency. Recognizing the differences in eastside conditions, Washington State's forest practice rules have narrower riparian buffers and different leave tree requirements on the eastside vs. the westside. Oregon's forest practice rules also have different streamside tree retention requirements on the eastside vs. westside, again in recognition of the different conditions.

We request, prior to finalization of the plan revision, that a science-based justification for the riparian buffer widths prescribed by the ARCS be added to the plan documents to help the public understand how this decision represents the best available science. If it does not, the Alternatives should be modified so that riparian management areas are designed based on best available science.

(5) With regard to the management strategies within Riparian Management Areas, a more proactive approach is needed to treat overstocked conditions within RMAs to reduce the long-term risk of loss from catastrophic fires, insects, and disease. Management of vegetation within riparian areas through thinning has mostly been ignored over the last 20 years and the buildup in fuels has made them more susceptible to loss. Recent experience here and elsewhere has shown that fires can burn just as hot through riparian zones as they do through upland forests. These areas are more sensitive and their loss has a greater overall ecological impact, including harm to threatened and endangered fish species. Therefore, it is even more important to protect the riparian areas from large scale disturbances.

The Tanner Gulch Fire, which occurred on the upper Grande Ronde River watershed of the Wallowa-Whitman forest in 1989, should have served as a wake-up call. This high-intensity burn is judged to have killed the entire 1989 adult spring Chinook salmon run in the upper Grande Ronde and eliminated much of the steelhead smolt production. Mudslides along small, burned-over creeks led to a major debris torrent in the Grand Ronde measured as far as 36 miles downstream. Ten years after the fire/flood event, this degraded stream was just starting to recover.

Yet the agency has not learned the lesson and continues to manage under a short-sighted strategy in which near-term risks from active management overwhelm thinking, preventing action, and the long-term risks of catastrophic loss are ignored.

We request that adaptive management of riparian management zones be made a core part of the strategy for management of MA 4B. This includes adaptations to the designation of RMAs and active treatment to restore sustainable conditions based on evolving science and controlled experimentation.

(6) We disagree with the timber salvage standards and guidelines under the preferred alternative (as well as Alts. B & F) that restrict timber salvage to less than 50 percent of post-fire source habitat, prohibit it entirely in burned areas less than 100 acres, and prohibit salvage of snags greater than 21-inches (WLD-HAB-19, 20, & 21).

These arbitrary limitations have not been adequately justified. When we have large, 5,000 acre plus fires, which we are increasingly likely to experience in the future, the agency needs the flexibility to respond appropriately to provide for recovery of the resource as well as provide badly needed timber to area mills. To avoid a major insect build-up in fire-stressed trees, aggressive salvage is needed.

(7) The TPSQ under Alt. E is inadequate to support the existing industry infrastructure. We have previously provided an estimate that 243 MMbf/year of appropriately sized sawlogs needs to be harvested from the three national forests just to keep the currently operating mills running. These include Boise at Elgin, Pilot Rock, and Mt. Emily, Blue Mountain Lumber in Pendleton, Malheur Lumber in John Day, and Guy Bennett Lumber in Clarkston. As previously discussed, an estimated 335 to 405 MMbf/year would be required from the forests to allow re-opening of the D.R. Johnson mills in John Day and Prairie City, restoring family-wage jobs where they are badly needed. An additional, predictable supply of sawtimber volume is needed to promote rebuilding of an industry in Harney, Baker, and Wallowa County, where it has already disappeared. This need is not even addressed.

These estimates take into account the long-term log supply available from private lands. They are consistent with the log supply requirements in a recent report on the primary wood processing facilities in eastern Oregon, prepared by Larry Swan, USFS State & Private Forestry. This information should have been included in the Affected Environment discussion.

The plan document states in multiple places that the agency understands the importance of retaining the regional industry infrastructure and workforce in order to accomplish the needed restoration work on the forests and provide an outlet for the products resulting from treatments. Yet, the TSPQ for the Preferred Alternative falls far short of the need.

In the case of the Malheur forest, the TSPQ under Alt. E (56 MMbf) falls short of the 75 MM bf promised by the Regional Forester in 2012.

CONCLUSION

The Eastern Oregon County Association and its member counties cannot support any of the Alternatives because, as the analysis itself shows, they do not make adequate progress toward achieving the key Desired Conditions either environmentally, socially, or economically. The pace and scale of restoration activity is simply insufficient to reverse the decline in resource conditions and to achieve key Desired Conditions within any reasonable timeframe. If implemented, we fear continued and increasing losses to catastrophic wildfire, insects, and disease causing degradation to fish and wildlife habitat as well as losses to economic and cultural resources. Our quality of life will be greatly diminished. We will see our logging, trucking, and milling infrastructure continue to shrink, losing half to two-thirds of its remaining capacity. With it, jobs will be lost, families and communities will be dislocated, and the ability to provide labor and capital to assist the agency in managing the resource will dissolve away.

We do not believe this plan revision process can be salvaged by tweaking an alternative here or there or by beefing up the analysis or clarifying the documentation. The plan revision process has been on-going for 10 years. Much of the basic work is now 8-10 years old. In many ways, it seems that the science and our approaches to land management (e.g. collaboratives, stewardship projects, etc.) have moved beyond where we were 10 years ago. The plan revision process, however, has not kept up and has not re-examined early assumptions, analysis, and directions in light of the progress made in the meantime. The proposed plan is a step backwards that we cannot afford to make.

The agency must go back to the drawing board and start fresh with a re-examination of the basic Plan Components, such as the Goals and Desired Conditions, Management Areas, and Objectives. It must do this in light of new science and new approaches, and changed circumstances. It must learn from this process but design a new way forward; one that will work for the environment, economy, and communities.

We, as the elected representatives of the communities most affected, want to continue to participate in that process. The resource is too important to our citizens to accept anything less than a plan that we can be confident will move us in the right direction.

UNION COUNTY
BOARD OF COMMISSIONERS

STEVE McCLURE, Commissioner
MARK D. DAVIDSON, Commissioner
WILLIAM D. ROSHOLT, Commissioner

1106 "K" AVENUE LA GRANDE, OR 97850 PHONE (541) 963-1001 FAX (541) 963-1079 TTY 1-800-735-1232

August 6, 2014

Ms. Sabrina Stadler
Blue Mountains Plan Revision Team
P.O. Box 907
Baker City, OR 97814

Dear Ms. Stadler:

The Union County Board of Commissioners appreciate this opportunity to comment on the Blue Mountains National Forests Proposed Revised Land Management Plan and Draft Environmental Impact Statement ("BMPR"). Our comments are applicable to all three national forests, unless otherwise noted.

Union County has been working with the Planning Team, as a Cooperating agency, since the very beginning of the BMPR process ten years ago. The eastern Oregon economy is largely resource-dependent and relies on access and productivity associated with public lands that dominate our landscape. Our communities are tied to the land culturally and economically. Our future economic and social well-being is dependent on wise stewardship of these lands. Thus, we have an enormous stake in the future of the three Blue Mountain national forests.

Sincerely,

Steve McClure
Union County Chairman

Mark D. Davidson
Union County Commissioner

William D. Rosholt
Union County Commissioner

BE IT REMEMBERED, that at a regular term of the Board of Commissioners of the State of Oregon, For the County of Union, sitting for the transaction of County business, begun and held at the Joseph Building Annex in the City of La Grande, for holding a regular term of said Commission, when were present:

The Honorable **Steve McClure, Chairman**
Mark D. Davidson, Commissioner
William D. Rosholt, Commissioner

WHEN, on Wednesday the 6th day of August, 2014, among others the following proceedings were had to wit:

IN THE MATTER OF THE	)	RESOLUTION
BLUE MOUNTAINS NATIONAL FORESTS	)	2014-12
PROPOSED REVISED LAND MANAGEMENT	)	
PLAN DRAFT ENVIRONMENTAL IMPACT STATEMENT	)	

WHEREAS, the Blue Mountain National Forests were established in 1904 and 1906, under the provisions of the Act of March 3, 1891 and the Act of June 4, 1897 for the specific purposes of improving and protecting the forests, to secure favorable conditions of water flows, and, to furnish a continuous supply of timber; and,

WHEREAS, the Blue Mountain National Forests were created with the support of the local population based upon the assurance to the public that the forest reservations were not in the nature of parks set aside for nonuse, but were established solely for the economic reasons set forth in the Acts of 1891 and 1897;

WHEREAS, in recognition that the burdens placed upon county governments as a result of the creation of the national forest reserves should be shared by the nation, Congress directed that the receipts generated from the national forest system WHEREAS, the national forests within its boundaries are the economic, recreational, social and cultural foundation of Wallowa County; and

WHEREAS, the national forests are required under the National Forest Management Act and the Renewable Resources Planning Acts, to develop Land and Resource Management Plans that reflect local conditions and in accordance with the purposes for which the forest reserves were created; and

THEREFORE BE IT HEREBY RESOLVED that the Union County Commissioners find all alternatives to be unfounded and requests that the Forest Service abandon all the Alternatives and reassess the conditions on the ground and develop a range of alternatives that address the on the ground conditions focusing on the need to improve and protect the forests; to secure favorable conditions of water flows; and, to furnish a continuous supply of timber.

DATED this 6th day of August, 2014.

Steve McClure, Chairman

Mark D. Davidson, Commissioner

William D. Rosholt, Commissioner

[NOTE: The remainder of the letter is a duplicate of the Eastern Oregon Counties letter above, with the exception of the following.]

BEFORE THE BOARD OF COMMISSIONERS
IN AND FOR THE COUNTY OF WALLOWA
IN AND OF THE STATE OF OREGON

IN THE MATTER OF THE	**)**	
BLUE MOUNTAINS NATIONAL FORESTS	**)**	
PROPOSED REVISED LAND MANAGEMENT	**)**	**RESOLUTION 2014-005**
PLAN DRAFT ENVIRONMENTAL IMPACT	**)**	
STATEMENT	**)**	

WHEREAS, the Blue Mountain National Forests were established from 1904 to 1907, under the provisions of the Act of March 3, 1891 and the Act of June 4, 1897 for the specific purposes of improving and protecting the forests, to secure favorable conditions of water flows, and, to furnish a continuous supply of timber, AND,

WHEREAS, the Blue Mountain National Forests were created with the support of the local population based upon the assurance to the public that the forest reservations were not in the nature of parks set aside for nonuse, but were established solely for the economic reasons set forth in the Acts of 1891 and 1897, AND,

WHEREAS, in recognition that the burdens placed upon county governments as a result of the creation of the national forest reserves should be shared by the nation, Congress directed that the receipts generated from the national forest system be shared with the counties, AND

WHEREAS, the national forests within its boundaries are the economic, recreational, social and cultural foundation of Wallowa County, AND,

WHEREAS, the national forests are required under the National Forest Management Act and the Renewable Resources Planning Acts, to develop Land and Resource Management Plans that reflect local conditions and in accordance with the purposes for which the forest reserves were created, AND,

WHEREAS, recent management of the national forests within Wallowa County have resulted in dramatic social, economic and forest health departures from the assumptions upon which the last Land and Resource Management Plan was based, AND,

WHEREAS, the departures from the Land and Resource Management Plan have been primarily the result of changing political theories rather than to reflect the changing forest conditions resulting from both natural and man-made disturbances, AND,

WHEREAS, the management strategies proposed in the Blue Mountains National Forests Proposed Revised Land Management Plan and Draft Environmental Impact Statement do not reflect the conditions on the ground or the resulting insect and fire cycles that have been experienced in the past on the Blue Mountain Forests, AND,

WHEREAS, Wallowa County in cooperation with the Eastern Oregon County Association retained forest scientists to review the proposed revised land management plan and draft environmental impact statement and to thoroughly vet the scientific foundations of the documents, AND,

WHEREAS, Wallowa County has reviewed both the results of the science analysis and the proposed plan and finds that the plan inadequately addresses the real and urgent needs of both the natural resource and surrounding communities; is based upon unvalidated scientific theories; is unduly influenced by political pressure; and, fails to conform with the primary purposes for which the Blue Mountain Forests were established.

THEREFORE, BE IT RESOLVED, that the Wallowa County Board of Commissioners finds all alternatives to be unfounded and requests that the Forest Service step back and reassess the conditions on the ground and develop a range of alternatives that address the on the ground conditions focusing on the need to improve and protect the forests; to secure favorable conditions of water flows; and, to furnish a continuous supply of timber.

DONE AND DATED this 11th day of August, 2014.

WALLOWA COUNTY BOARD OF COMMISSIONERS

_____	_____
Chairman Mike Hayward	Commissioner Susan Roberts
_____	_____
Commissioner Paul Castilleja	Attest: David Riley, Exec. Asst.

7/14/2014

Perry Patrick
Wheeler County
PO Box 447
Fossil, OR 97830

Dear Ms. Stadler:

Wheeler County is submitting this letter as public comment on the Blue Mountain Forest Plan. Wheeler County could support alternative "D", but is especially concerned about this, new to us, "Back Country Designation". We feel this is creating wilderness without congressional process and taking lands out of production that could ultimately support roads and schools through timber receipts.

Wheeler County also has concerns about limiting livestock grazing on public lands; a revenue that comes to counties in the form of "Taylor Grazing Receipts", which counties receive a share of the revenues.

Alternate "D" would allow for vacant and/or inactive allotments to be used with an end result of more revenue to counties, which would enable them to provide more services to the public that uses these public lands.

When a person who is on national forest lands needs emergency services, be it ambulance, Search and Rescue or law enforcement, the call to 911 goes to dispatch, who then sends out county resources that are currently getting less support from the forests and placing more of the burden on local general funds.

Please consider alternative "D". It gives the most support to local Timber dependent communities.

Sincerely,

Patrick C. Perry
Wheeler County Judge

Allison O'Brien
U.S. Department of the Interior
Regional Environmental Officer
620 SW Main Street
Suite 201
Portland OR 97205

August 13, 2014

Sabrina Stadler
Blue Mountains National Forest
1550 Dewey Ave.
Baker City, OR 97814

Dear Ms. Stadler:

The Department of the Interior has reviewed the U.S. Forest Service Draft Environmental Impact Statement for the Proposed Revised Land Management Plans for the Malheur, Umatilla, and Wallowa-Whitman National Forests, Oregon. The Department has no comments on the document at this time.

We appreciate the opportunity to comment.

Sincerely

Allison O’Brien
Regional Environmental Officer

Unites States Department of Agriculture **Forest Service** **Region 1 Nez Perce National Historic Trail** **12730 Highwya 12 Orofino, ID 83544**

File Code: 2350-1

Date: July 14, 2014

Sandi McFarland
Administrator
Nez Perce National Historic Trail
12730 US Hwy 12
Orofino, ID 83544

Sabrina Stadler, Forest Plan Revision Team
Blue Mountains National Forests
P.O. Box 907
Baker City, Ore on 97814

Dear Ms. Stadler,

The Nez Perce National Hjstoric Trail is potentially impacted by your draft Proposed Revised Land Management Plans for the Malheur, Umatilla, and Wallowa-Whitman National Forests.

The Nez Perce National Historic Trail is not assessed in this plan revision even though the Trail crosses both Wallowa Valley Ranger District lands and the Hells Canyon National Recreation Arca. This revision considers the Nez Perce National Historic Trail has already assessed under the 2003 Hells Canyon National Recreation Arca Comprehensive Management Plan (HCNRACMP). The HCNRACMP did not fully assess the Nez Perce National Historic Trail. That Plan addressed the section of the Trail as a nonnal forest system trail not a congressionally designated trail under the National Trails System Act of 1968 (as amended).

Neither the HCNRACMP nor this document addresses the Nez Perce National Historic Trail Auto Tour routes or recreational facilities located on the Wallowa-Whitman National Forest.

I am attaching our comment response for your review.

If you have any further questions please contact Julie Molzahn, Nez Perce National Historic Trail Comprehensive Management Plan Coordinator at 406-826-4352 or jmolzahn@fs.fed.us.

Sandi McFarland.

SANDI MCFARLAND
Administrator
Nez Perce National Historic Trail

CC: Aaron Mahr, Superintendent Intermountain National Trails Office Tami DeGrosky, Superintendent Nez Perce National Historic Park

Attachment

Nez Perce National Historic Trail Response

To Blue Mountain National Forests

Proposed Land Management Plan Revision

7.14.14

Summary

Page 3- This page indicates that because the Hells Canyon National Recreation Area (HCNRA) Comprehensive Management Plan was completed in 2003 that resources located with the in HCNRA will not be further addressed. The 2003 HCNRA Comprehensive Management Plan does not address the Nez Perce National Historic Trail (NPNHT) nor does it refer to the 1990 NPNHT Comprehensive Plan to incorporate the Plans direction by reference. This Plan revision will need to address the NPNHT. We are requesting that a Management Area be established for the NPNHT like this Plan revision has developed for the Oregon National Historic Trail (ONHT). The NPNHT is designated across the Wallowa Valley Ranger District before it enters into the HCNRA so the assumption that the NPNHT is only in the HCNRA is erroneous. The NPNHT also have auto tour routes that travel across the HCNRA and Wallowa Valley Ranger District that need to be assessed.

Page 7 - please list the NPNHT and ONHT specifically has the two National Historic Trails located within these Forests under the Special Area Description.

Page 56 last paragraph- Add the NPNHT and ONHT Auto Tours has dispersed facilities along with Scenic Byways.

Page 57 paragraph 4- specifies NPNHT and ONHT under the discussion about destination trails or add a discussion about the significance of National Historic Trail to Backcountry Recreation section.

Page 60-62 Roads and Trails Access- please add NPNHT to this discuss in the first paragraph on page 60 where there Is a discussion of routes significant to Nez Perce and Umatilla Tribes.

Page 68 Landownership- the NPNHT and ONHT are areas where purchasing parcels for trail protection is a priority. Please add a discussion about acquiring lands for the protection of these national historic trails.

Page 76 Management Area Designation- please changes this table to include NPNHT acreage in HCNRA since that plan did not address the NPNHT. Drop the reference that the NPNHT is not included in the acreage because it is addressed in the HCNRA. The NPNHT starts outside the HCNRA as stated above.

Page 85 Table 21- National designated trails- please add NPNHT trail mileage and for each national historic trail the mileage includes their accompanying auto tours which are not address for either NPNHT or ONHT in this document.

General Concern- there is no Standards or Guidelines for Management Area 2G National Trails so this could allow non-compatible uses such as timber harvesting within trail corridors and use of heavy equipment on the trails. The NPNHT is hiking and equestrian use only however this is not mentioned anywhere in this document or the HCNRA Comprehensive Plan.

Please develop Management Area standards and guidelines for National Trails and include NPNHT in this discussion. This is Management Area description below is one that the NPNHT developed with the Shoshone National Forest revised LRMP for the NPNHT Management Area similar to your plans 2G. . I am including as an example for you to consider:

The Nez Perce (Nee-Me-Poo) National Historic Trail (NPNHT} is managed to protect its historical values while providing recreation opportunities in a natural appearing landscape consistent with *The 1990 Nez Perce National Historic Trail Comprehensive Plan* and any revisions therefore after (USDA Forest Service 1990).

Desired conditions

> **The NPNHT protects the historical values for which the NPNHT was designated while providing a high quality scenic, primitive hiking and pack and saddle stock experience. Activities within the NPNHT corridor will not preclude further management options for the NPNHT. A variety of compatible recreation opportunities are provided. Access to the NPNHT is primarily by foot and horseback. Roads and motorized trails are not present except at designated crossings.**
>
> **The NPNHT corridor Is characterized by a predominantly natural appearing environment. Improvements such as trailheads, trails, signs, bridges, and fences that enhance the recreation opportunities may be present. Evidence of past and present resource management may exist, but blends with the natural appearance of the landscape. Vegetation alterations may be present to enhance viewing opportunities.**

On page 144 there is a sentence indicating no specific standards and guidelines are including in the plan for Management Area 2G National Trails. Why is there a designated Management Area with no standards and guidelines to protect values? This list also includes Management Area 2F Scenic Byways and All-American Roads.

Additionally of concern is that there are no Standard and Guidelines for Management Area 2F Scenic Byways and All-American Roads. There needs to be some description and discussion of the protection or preservation of scenic integrity and recreation opportunities along these roads. Additionally we would like to request that the NPNHT and ONHT Auto Tour routes be added to this Management Area designation.

Volume 1

Page 52, Tables 4 and 5 do not include the NPNHT mileage under MA2G

Page 69, paragraph 1, Please add a sentence about the 1877 Nez Perce War and Flight beginning in the Joseph, Oregon area which the Chief Joseph band leaving their homelands.

Volume 2

Page 48 paragraph 1, 4th sentence- There is a discussion on how several alternatives will not allow any additional trail construction because of wildlife concerns. The NPNHT has not been fully mapped, designated and constructed on the Wallowa Valley Ranger District into the HCNRA. Please clarify if this direction will impact future development of the NPNHT.

Page 388-390, Recreation Settings- Include a discussion of the NPNHT, associated interpretive site within the Wallowa Whitman, and Auto Tours in this section as part of existing condition.

Page 415, Table 386 Designated Trails- Please drop the language about NPNHT covered under HCNRA and add it to this table and the discussion about Nationally Designated Trail on this page.

Page 422, Scenery Resource discussion- Please add NPNHT and ONHT in this discussion about specific sites that have scenic attributes to be preserved. These are Congressional designated trails which should be considered as high under the scenic integrity measure.

Page 426- Heritage Program discussion- There Is no mention of the NPNHT or ONHT in this discussion has existing historic resources to be managed. Please add both Trails to this discussion and assess the plans effects on their historical character.

Volume3

Glossary, page 33-Add National Trails System Act and National Historic Trails to this page

Appendix A, page 159, Table A-1, Management area designation- This table is showing no acreage for either Management Area 2F Scenic Byways and All-American Roads and Management Area 2G National Trails. How can a designated management area have no acreage? Are these truly protective and manageable areas?

Page 216, MA 2F Scenic Byways and All American Roads - Please consider adding NPNHT and ONHT Auto Tours to this management area and discussions. Please consider developing standards and guidelines for this management area.

Page 216-217, MA 2G Nationally Designated Trails- Please add NPNHT to this management area and discussions •. Please consider developing standards and guidelines for this management area.

Page 369, Appendix C, Cumulative Effects - list of associated plans-Land Management Plans- please add:

- 1990 Nez Perce National Historic Trail Comprehensive Plan
- 1999 Management and Use Plan Update Final Environmental Impact Statement, Oregon National Historic Trail and Mormon Pioneer National Historic Trail, U.S. Department of Interior National Park Service

Maps- Please add NPNHT to all the Plan maps associated with recreation, trails and roads.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suile 900
Seattle, WA 98101-3140

OFFICE OF
ECOSYSTEMS, TRIBAL, AND
PUBLIC AFFAIRS

August 15, 2014

Ms. Sabrina Stadler
Forest Plan Revision Team Leader
Blue Mountains Forest Plan Revision
P.O. Box 907
Baker City, Oregon 97814

Re: EPA Region10 Comments on the Draft Environmental Impact Statement and Proposed Revised Land Management Plans for the Malheur, Umatilla, and Wallowa-Whitman National Forests (EPA Project 10-015-AFS)

Dear Ms. Stadler:

We have reviewed the above-mentioned Draft Environmental Impact Statement (DEIS) and Proposed Revised Land Management Plan (Forest Plan) in accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act. Under our NEPA Review policy and procedures, we rate DEIS documents by considering both the adequacy of the document and the potential environmental impacts of the action.

The DEIS documents the analysis of a No Action Alternative (Alternative A), and five action alternatives (Alternatives B through F). The Action Alternatives address five purposes and needs for the revised plans: (l) to more adequately protect and restore terrestrial plant and animal species and their habitats; (2) to address management of fuels and fire risk; (3) to more adequately protect and restore watersheds and aquatic habitats; (4) to address climate change; and (5) to recognize the interdependency of social and economic components with national forest management. Alternative 8 is the Modified Proposed Action, and Alternative Eis identified as the Preferred Alternative. Alternative E would use vegetation management, aquatic and wildlife habitat treatments to emphasize active restoration to a greater extent than Alternative 8. With regard to roads, Alternative E would focus on reducing hydrologic connectivity to roads as opposed to focusing on a metric related to road density. Consequently, riparian and aquatic habitat improvement activities and road maintenance proposals for investments in aquatic restoration within key and priority watersheds would be greater under Alternative Ethan under Alternative 8.

The EPA is supportive of the overarching direction of Alternative E. We support the guidance provided within the 2014 revision of the Interior Columbia Basin Strategy and Aquatic Framework (IC8 Strategy)[29]. Our review of the DEIS finds Alternative E to be largely consistent with this strategy. Although our review does not focus on Alternative D, we would like to establish that the EPA would not support the riparian strategy proposed under Alternative D. We agree with the conclusions reached in the DEIS on page 280 regarding the Alternative D riparian strategy. This alternative would likely result

[29] http:/iwww.icbemp.gov/html/lCBEMP Frameworkmemorandum-and-strategy 2014.pd

in a declining trend in overall watershed improvement and a potential for degradation of watershed condition, water quality, and soil quality in some areas.

In the comments that follow, we identify areas where we believe additional infonnation, detail and/or standards and guidelines would improve the document and ensure consistency with the principles established and agreed to by the Interior Columbia Basin Deputies within the ICB Strategy. Our comments focus on the need for clarity regarding active management within riparian zones; the identification and management of landslide prone sites; the management of minerals and mining, particularly with regard to financial assurance; and the identification of old forest. We also indicate a preference for the more protective forage utilization rates under Alternative F.

Based on our review, we are rating the DEIS as EC-2 (Environmental Concerns - Insufficient lnfonnation). An explanation of this rating is enclosed. We support the collaborative, science-based approach taken by the Blue Mountains Planning Team and we encourage you to continue to engage with the many Forest Collaboratives working within the Blue Mountains F'orests as you finalize this EIS and Forest Plan.

We appreciate the opportunity to review and comment on the DEIS, and we welcome the opportunity to engage with the planning team as you move forward. If you have any questions about our review, please contact me at (206) 553-1601, or by electronic mail at reichgott.christine@epa.gov. Or you may contact Teresa Kubo ofmy staff at (503) 326-2859, or by electronic mail at kubo.teresa@epa.gov.

Sincerely,

Christine B. Reichgott, Manager
Environmental Review and Sediment Management Unit

Enclosures

Riparian Management Objectives

Consistent with the overall direction in the Aquatic Riparian Conservation Strategy[30] (ARCS), the DEIS and Draft Forest Plan do not identify specific metrics related to water temperature; large woody debris in forested systems; bank stability in non-forested systems; lower bank angle in non-forested systems; width/depth ratio; and pool frequency (wetted width and pools per mile).This represents a difference between ARCS and the Interim Objectives under P ACFISH/INFISH. The P ACFISH/INFISH strategy established specific riparian management objectives (RMOs) for each of these habitat components. The PACFISH/INFISH RMOs were established based on the best science available at the time; species recovery needs; and the desire to establish metrics against which to measure progress. While the PACFISH/INFISH RMOs may not be ecologically suited to all locations on all three Forests, we believe there is continued value in establishing more specific objectives related to riparian and aquatic conditions.

Recommendation: We recommend that the FEIS and Final Plan include more specificity (quantitative or qualitative) with regard to objectives for water temperature; large wood; bank stability; bank angle; width/depth ratio and pool frequency.

Riparian Restoration/Shade

It is noted within the DEIS (page 267) that many riparian zones within dry upland forests are highly departed from the historical range of variability. Alternative E is described as providing greater emphasis on vegetation restoration within the riparian zone (DEIS Volume l, page 280). It would be helpful to have some additional specificity within the EIS and Forest Plan about what kinds of harvest treatments would be pursued in riparian zones. We recognize that treatments would be site specific, however a range of residual densities and canopy closures by site type would add to the reviewers understanding of the action alternatives.

Of particular interest to the EPA is the potential for management to influence solar shading (positively or negatively) in the riparian zone, as well as expected recovery periods when initial treatment may reduce shade. Page 273 of Volume I of the DEIS states, "For 303d-listed streams in National Forest System lands in the Blue Mountains, 59 percent of stream miles are listed due to stream temperature." While Total Maximum Daily Loads (TMDLs) in Oregon and Washington identify multiple sources of temperature impairment, it is recognized that stream shade provided by riparian vegetation has the most widespread achievable effect on reducing stream temperatures by reducing direct solar radiation. In order to protect water quality and support TMDL implementation, the EPA supports management that emphasizes the protection and restoration of shade as well as healthy communities of riparian vegetation.

Recommendation: We recommend that the FEIS and Forest Plan include additional specificity about the types of harvest treatments that would be pursued in riparian zones. We recommend that this

[30] U.S. Department of Agriculture, Forest Service. 2008. Aquatic and riparian conservation strategy (ARCS). Portland, OR, U.S. Department of Agriculture, Forest Service, Pacific Northwest Region: 49 p.

discussion include a range of residual densities and canopy closures by site type and anticipated timeframes for shade recovery.

Landslides
Landslides are recognized within the DEIS as a key disturbance that can influence watershed function. The DEIS also recognizes the need to buffer landslides and landslide-prone areas. The DEIS and Draft Forest Plan do not, however, include a discussion of landslides or landslide prone areas within the Forest Plan components (goals, desired conditions, objectives, standards and guidelines). Given the potential for landslides to alter landscapes and affect infrastructure, water quality, and fish and wildlife habitat

(particularly after fire), we recommend the Final Plan give additional consideration to the identification and management of landslide prone areas. A discussion of landslides as a disturbance process could be included within Volume 2 of the FEIS (under Aquatic Species Diversity and Viability) and within section 1.4 of the Forest Plan (Disturbance Processes).

Recommendation: We recommend the FEIS and Forest Plan include a discussion oflandslides as a disturbance process. We also offer the following Goals, Objectives and Standards as examples for Forest Service consideration:

- Site-specific analysis or field verification of broad-scale landslide-prone models (such as NetMap) shall be conducted in representative areas that are identified as landslide prone during site/project-scale analysis involving proposed management actions that may alter soil-hydrologic processes. Based on the analysis findings, design management actions to avoid the potential for triggering landslides (Standard).
- Field-verified high-risk landslide-prone sites are identified as not suited for timber production. Wood products harvested from high-risk landslide-prone sites will not contribute to the ASQ (Standard).
- Where proposed management actions may alter soil-hydrologic processes, representative sample oflandslides and landslide-prone areas should be field-verified to identify and interpret controlling and contributing factors of slope stability. Integrate the resulting infonnation with supporting data to provide a final stability assessment and identification of appropriate land management actions in landslide and landslide-prone areas (Guideline).

Roads
The preferred Alternative (Alternative E) includes a desired condition for open motor vehicle route density depending on the management area and winter elk habitat. Overall, the desired route density is below current route density. Alternative E differs from the other Action Alternatives in that it focuses on reducing hydrologic connectivity as opposed to focusing strictly on road density. The intent is to focus on roads that are contributing the most sediment to the aquatic and riparian system. The EPA supports this approach. As noted on page 264 of Volume I of the DEIS, an analysis of National Forest System roads within the Umatilla National Forest in the Wall Creek watershed found that 90 percent of road-related sediment is produced by 12 percent of the road network. Given limited resources, we believe targeting erosion reduction treatments to the most critical sites is a sound approach. The EPA supports mid-scale or watershed analysis as a tool for identifying these restoration opportunities. We also support the use of tools such as the Geomorphic Road Analysis and Inventory Package (GRAIP), which was used on the Wall Creek Watershed. We encourage the use of GRAIP (or GRAIP Light) in those watersheds known to be experiencing extensive road-related runoff. We believe GRAIP is one of the most effective tools currently available for analyzing the impacts of road systems on erosion and sediment delivery to streams.

Forage Utilization Rates
The EPA favors the Alternative F maximum utilization rates and minimum residual stubble height within riparian areas because we believe the Alternative F utilization rates would potentially result in higher rates of animal rotation. When cattle graze, the bite size and biting rate is governed by forage quality and quantity. Each time cattle are turned into a new pasture, they rapidly graze the best forage leaving lower quality forage behind. Through defecation and urination, the remaining forage quickly loses quality and utilization rapidly declines. In fresh pastures, the intake rate is high, and the cows get 'full' quickly, thereby minimizing time spent grazing.[31] Less time grazing would reduce grazing-related environmental impacts. As noted on page 269 of Volume I of the DEIS, Livestock grazing effects include trampling, soil compaction, and loss of vegetative cover. In addition, overuse in riparian zones affects the stability of stream channels, changes channel fonn (widening), and reduces resistance to floods.

Recommendation: We recommend the final selected alternative incorporate Alternative F utilization rates and minimum residual stubble height.

Minerals and Mining
The proposed Forest Plan does not bring forward some of the PACFISH/INFISH standards and guidelines related to mining and minerals. In particular, we note the elimination of standard MM-I, which states:

Standard MM-I. Avoid adverse impacts to listed species and designated critical habitat from mineral operations. If the Notice of Intent indicates that a mineral operation would be located in an RHCA and could affect attainment of RM Os or could adversely affect listed anadromous fish, then require a reclamation plan, approved Plan of Operations (or other such governing document), and reclamation bond. For effects that cannot be avoided, such plans and bonds must addres the following items to attain RMOs and avoid adverse effects on listed anad omousfish: the costs ofremovingfacilities, equipment, and materials; recontouring disturbed areas to approximate pre-mining topography; isolating and neutralizing or removing toxic or potentially toxic materials; salvage and replacement of topsoil; and seedbed preparation and re-vegetation. Ensure Reclamation Plan contain measurable attainment and bond re/ease criteria for each reclamation activity.

The EPA has been working across multiple agencies and at multiple levels of government in order to ensure that mining operations are subject to adequate levels of financial assurance. We believe language such as that found in Standard MM-I supports that objective.

Recommendations: We strongly encourage the Forests to continue to include standard MM-1 in the Forest Plan. We also recommend consideration of the standards and guidelines included within the Forest Plan for the Boise National Forest related to mining and minerals. Those standards and guidelines can be found at http://www.fs.usda.gov/lnternet/FSE DOCUMENTS/stelprdb5394129.pdf. The Mineral and Geology Resources section begins on page III-50. We encourage the Forests to incorporate some of the specificity within the Boise National Forest standards and guidelines into Forest Plan for the Blue Mountains.

[31] http://smallfanns.oregonstate.edu/sfn/spg09pasture

Large Old Trees

Alternative E would manage for old forest and large diameter/old trees where they occur on the landscape based on a guideline that emphasizes retaining live trees with certain old tree characteristics. This would be a move away from screening trees from harvest based on diameter. The EPA is generally supportive of this direction. The view of the EPA is that while the eastside screening of trees over 21 inches has served to build trust among stakeholders and protect important remnant medium and large trees, a broad body of science now supports a more ecologically-based approach.[32] As the FEIS is developed, it would be helpful to have additional information about how older stands/trees would be identified. The DEIS references the 2008 Van Pelt guidelines[33] as one way old trees can be identified. The guideline within the Draft Forest Plan, however, indicates that old tree characteristics should be developed on a site-specific project basis. This leaves some question as to how the Forests will ensure the intent of the Plan is achieved across all three Forests. In the FEIS and final Forest Plan, we encourage the Forest Service to include additional infonnation about how older trees/stands will be identified.

Recommendation: Guideline OF-I related to individual old trees should better define the approach to be used to identify older forest. We would support language indicating that the site specific approach for identifying old growth should take into account geographic context; tree size; tree age; tree species; spatial distribution; relative abundance; the historical (and future) range of variability; forest health; and the potential of an area to grow large trees.

Plan Objectives

Starting on page 238 of Volume 3, the DEIS provides a series of tables (A-48, A-49, and A-50) that outline objective statements for the three Blue Mountains Forests. The objectives associated with the final selected Alternative will be carried forward into the final Forest Plan. These tables are a helpful tools for synthesizing and communicating the intent of the Forest Plan. The utility of these tables would be augmented by the addition of some contextual information. As an example, under Objective l. l

(Watershed Function) the tables provide objectives related to riparian restoration. It is unclear to what extent the objectives overlap, or are independent of one another (i.e. the extent to which the accomplishment of one objective can count toward the accomplishment of another). For example, can miles ofrestored "floodplain connections, channel morphology, channel structure, and flow regime" count toward the later objective of miles of"stream morphology restored"?

We are also interested in those objectives related to riparian restoration. We note that under Alternative E (the preferred alternative) there is an objective for the Umatilla National Forest to restore 165 acres

(over IO years) of riparian/wetland species composition by "increasing natural seedling, planting, fencing, or modifying riparian management." For the same forest, there is also the objective of improving 525 acres annually of stream channel and aquatic habitat function by "improving riparian habitat conditions." We recommend that the FEIS and Plan include additional context around these activities. We anticipate that the 525 acres to be improved annually would be the result of passive restoration, whereas the 165 acre target refers more to more active restoration, however this is not immediately clear from reading the table or introductory text.

Recommendation: We recommend the Forest Service clarify the extent to which Plan Objectives in Tables A-48 through A-50 overlap or are independent of one another. We further recommend the FEIS clarify which objectives relate to active versus passive management.

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[32] http://www.fs.fed.us/pnw/publications/MMC Synthesis 21 Nov 13.pdf

[33] http://www.dnr.wa.gov/Publications/lm hep west oldgrowth guide full lowres.pdf

U.S. Environmental Protection Agency Rating System for
Draft Environmental Impact Statements
Definitions and Follow-Up Action*

Environmental Impact of the Action

LO - Lack of Objections
The U.S. Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC - Environmental Concerns
EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO - Environmental Objections
EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU - Environmentally Unsatisfactory
EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1 - Adequate
EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 - Insufficient Information
The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 - Inadequate
EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment. February, 1987.

Preparers and Contributors

List of Preparers

This list of preparers is limited to those people who were members of the interdisciplinary team working on these documents. Their preparation could not have been completed without the support and assistance of employees of the Malheur, Umatilla, Wallowa-Whitman National Forests and our colleagues in the regional office. We also recognize the forest leadership teams as providing guidance during this process.

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Distribution of the Final Environmental Impact Statement

This environmental impact statement has been distributed to, or made electronically available to, over 2,000 individuals and groups who specifically requested a copy of the document or commented during public involvement opportunities. In addition, copies have been sent (or in some cases made electronically available) to Federal agencies, federally recognized Tribes, State and local governments, and organizations that have requested to be involved in the development of this analysis. These entities include the U.S. Environmental Protection Agency; U.S. Army Corps of Engineers; U.S. Department of the Interior; Federal Highway Administration; Advisory Council on Historic Preservation; USDA National Agricultural Library; State wildlife and fisheries management agencies; Tribes; county commissions; and local community governments. Due to the number of people, agencies, and organizations, a complete listing has been omitted from this Environmental Impact Statement, but is available upon request or on the World-Wide Web at the Blue Mountains plan revision Web site (https://www.fs.usda.gov/detail/wallowa-whitman/landmanagement/planning/?cid=stelprdb5247447).

Glossary and Acronyms

Many definitions in this glossary are from the following sources. Some definitions are in general use within the Forest Service. Terms adequately defined in general dictionaries are not necessarily included, though some of those that are less well known are included for the convenience of the reader.

Partial Source List

- National Forest Management Act Regulations ([1982] 36 CFR 219)
- Dictionary of Forestry (Helms 1998)
- Wildland Planning Glossary (USDA Forest Service 1976)
- Wildlife Habitats in Managed Forests, the Blue Mountains of Oregon and Washington (Thomas et al. 1979)
- Forest Service Manual or Forest Service Handbook
- A Glossary of Terms Used in Range Management, Second Edition (Society for Range Management 1974)
- Interior Columbia Basin Ecosystem Management Project DEIS (USDA Forest Service 1997)
- Wallowa-Whitman National Forest Land and Resource Management Plan (USDA Forest Service 1990)
- Interior Columbia Basin Ecosystem Management Project SDEIS (USDA Forest Service 2000)
- Interior Columbia Basin Ecosystem Management Project FEIS (USDA Forest Service 2000)
- A Dictionary of Ecology, Evolution, and Systematics (Cambridge University Press 1982)
- Webster’s Dictionary
- HCNRA Public Land Use Regulations (36 CFR 292.41)
- HCNRA Private Land Use Regulations (36 CFR 292.21)

A

active management: Planned, intentional actions in an area that are specifically designed to obtain a desired objective or result.

active restoration: Refer to restoration.

activity unit: An area on which one or more activities occurs. Activity units may be analogous to stand or timber sale harvest unit (polygon). An activity unit can be a polygon (acres), line (miles) or point (each) geospatial feature.

adaptive management: An approach to natural resource management in which decisions are made as part of an ongoing process. Adaptive management involves planning, implementing, monitoring, evaluating, and incorporating new knowledge into management approaches based on scientific findings and the needs of society.

Effects are monitored for the purpose of learning and adjusting future management actions, which improves the efficiency and responsiveness of management.

administrative site: Areas such as work centers, fire lookouts, permitted ranch headquarters, seed orchards, communication sites, utility corridors, and other areas that are occupied or used by the Forest Service during the administration of work associated with national forest lands.

administrative unit: A management area such as the Wallowa-Whitman National Forest, under the administration of one line officer. Forest Service line officers include district rangers and forest supervisors.

advance regeneration: (also called advance reproduction or advance growth). Seedlings or saplings that develop or are present in the understory.

air pollutant: Any substance in air that could, if in high enough concentration, harm humans, animals, vegetation, or material. Air pollutants may include almost any natural or artificial matter capable of being airborne, in the form of solid particles, liquid droplets, gases, or a combination of these.

air quality: The composition of air with respect to quantities of pollution therein, used most frequently in connection with standards of maximum acceptable pollutant concentrations.

allotment (grazing): Area designated for the use of a certain number and kind of livestock grazing for a prescribed period.

allotment management plan (AMP): A document that specifies the actions from a NEPA decision to be taken to manage and protect the rangeland resources and reach a given set of objectives.

allowable sale quantity (ASQ): The quantity of timber that may be sold from the area of suitable land covered by the Forest Plan for a time period specified by the plan. This quantity is usually expressed on an annual basis as the average "annual allowable sale quantity."

all-terrain vehicle (ATV): Off-highway-vehicles with less than or equal to a 50 inch wheel base, three or more low-pressured tires, handle bar steering and a seat designed to be straddled.

anadromous fish: Fish that hatch in fresh water, migrate to the ocean, mature there, and return to fresh water to reproduce; for example, salmon and steelhead.

analysis file: A file containing records of the scoping and analysis processes conducted during the preparation of a NEPA document. The file is typically stored at the Forest Service office from which a final decision is issued.

animal unit: One mature cow of approximately 1,000 pounds, either dry or with calf up to 6 months of age, or the equivalent (one horse, five domestic sheep). This concept is based on a standardized amount of forage consumed.

animal unit month (AUM): The amount of forage required by one mature (1,000 lb.) cow or its equivalent for one month (based upon average forage consumption of 26 lb. of dry matter per day). Refer to head month.

annual assessment: Yearly assessment of the degree to which on-the-ground management is maintaining or making progress toward the desired conditions and objectives.

anthropogenic: Caused or produced through the agency of man; the scientific study of the origin of man.

aquatic: Pertaining to water.

Aquatic and Riparian Conservation Strategy (ARCS): A regional strategy designed to restore and maintain the processes that create and maintain conditions in aquatic ecosystems on national forest lands in Oregon and Washington.

aquatic ecosystem: Waters that serve as habitat for interrelated and interacting communities and populations of plants and animals. The stream channel, lake or estuary bed, water, biotic communities and the habitat features that occur therein.

assessment: The collection, integration, examination, and evaluation of information and values.

authorized grazing: Refer to grazing permit.

B

basal area: The area of the cross-section of a tree inclusive of bark at breast height (4.5 feet or 1.37 meters above the ground) most commonly expressed as square feet per acre or square meters per hectare..

basalt: A finely or fine grained, dark, dense volcanic rock.

base sale schedule: A timber sale schedule formulated on the basis that the quantity of timber planned for sale and harvest for any future decade is equal to or greater than the planned sale and harvest for the preceding decade, and this planned sale and harvest for any decade is not greater than the long-term sustained yield capacity ([1982] 36 CFR 219.3). This definition expresses the principle of nondeclining flow.

basin (river): (1) In general, the area of land that drains water, sediment, and dissolved materials to a common point along a stream channel. River basins are composed of large river systems; (2) in the National Hydrography Dataset (NHD), a 3rd-field hydrologic unit denoted by a six-digit number (HU6, formerly HUC3), or three two-digit numeric fields. For example, 17 is the numeric code for the Columbia hydrologic region, 1702 represents the Middle Columbia sub-region, and 170702 is the numeric code for the John Day basin. In the Columbia Region, basin areas range from 2.6 to 20.8 million acres and average 8.2 million acres in size. See also: subbasin, watershed, and subwatershed.

benches: Mid-elevation flat or gently sloping sites. Grazing and homesteading/ranching activities were concentrated in these areas, which were also used by American Indians for pasturing livestock. Benches from 2,000 to 4,500 feet generally have potential to support the bunchgrass associations described for the lower and mid-position slopes. Cheatgrass brome, Kentucky bluegrass, and an assortment of annual and perennial forbs (including some noxious weeds) dominate much of the benchland, some of which was severely disturbed by early farming and ranching activities.

beneficial uses: Any of the various uses which may be made of the water, including, but not limited to, domestic water supplies, fisheries and other aquatic life, industrial water supplies, agricultural water supplies, navigation, recreation in and on the water, wildlife habitat, and aesthetics.

best management practices (BMPs): Practice or set of practices that enable a planned activity to occur while still protecting the resource managed, normally implemented and applied during the activity rather than after the activity.

best management practices (BMPs) (Watershed): A practice or a combination of practices, that is determined by the state (or designated area-wide planning agency) after problem assessment, examination of alternative practices, and appropriate public participation to be the most effective,

practicable (including technological, economic, and institutional considerations) means of preventing, or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals.

big game: Those species of large mammals normally managed as a sport hunting resource. Generally includes; elk, moose, white-tailed deer, mule deer, mountain goat, bighorn sheep, black bear and mountain lion.

biological diversity (biodiversity): The variety and variability among living organisms and the ecological complexes in which they occur.

biological soil crust: Thin crust of living organisms on or just below the soil surface composed of dense, low-growing community of various combinations of algae, mosses, liverworts, cyanobacteria (blue-green algae), micro fungi, bacteria, and lichens; and provide important components of grassland, shrub-steppe, and subalpine habitats. Also referred to as cryptogrammatic or microbiotic crust.

biophysical: The combination or grouping of biological and physical components in an ecosystem.

biotic: Living.

biomass: Dry weight of organic matter in plants and animals in an ecosystem, both above and below ground.

board-foot: A specialized unit of measure for the volume of rough-sawn lumber and timber in the United States and Canada. It is the volume of a one-foot length of a board one foot wide and one inch thick. It is commonly abbreviated BF. Thousand board-feet can be abbreviated MBF. Similarly, million board-feet can be abbreviated MMBF.

boreal: Pertaining to cool or cold temperature regions of the northern hemisphere; the northern coniferous zone.

broad scale: A large, regional area, such as an entire river basin and typically a multi-state area.

browse: That part of leaf and twig growth of shrubs, woody vines, and trees available for animal consumption.

Bureau of Land Management (BLM): An agency within the U.S. Department of the Interior with land management responsibility for the public domain lands.

C

candidate species: Plant and animal species that may be proposed for listing as endangered or threatened in the future by the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS); these species have no legal protection under the Endangered Species Act (ESA).

canopy: In a forest, the branches from the uppermost layer of trees; on rangeland, the vertical projection downward of the aerial portion of vegetation.

canopy closure: The proportion of the sky hemisphere obscured by vegetation when viewed from a single point (Jennings et al. 1999).

canopy cover: The proportion of the forest floor covered by the vertical projection of the tree crowns (Jennings et al. 1999).

capability: The potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and at a given level of management intensity. Capability depends upon current conditions and site conditions such as climate, slope, landform, soils, and geology, as well as the application of management practices, such as silviculture or protection from fire, insects, and disease.

capital investment: An input that increases the stock of natural or man–made resources (assets) needed to maintain or increase the flow of outputs in the future. Benefits resulting from capital investments are normally recouped in excess of one year; activities that create or improve capital assets to obtain benefits occurring during several planning periods.

carrying capacity: The number of animals or plants that can be maintained over a specific period of time on a specified amount of land without damage to either the organisms or the habitat.

cavity: The hollow excavated in a tree that is used by birds or mammals for roosting and/or reproduction.

ceded lands: Lands that American Indian Tribes ceded to the United States by treaty in exchange for reservation of specific land and resource rights, annuities, and other promises in the treaties.

channel (stream): The deepest part of a stream or riverbed through which the main current of water flows.

channel morphology: The dimension (width, depth), shape and pattern (sinuous, meandering, straight) of a stream channel.

chargeable volume: All timber volume included in the growth and yield projections used to arrive at the allowable sale quantity, based on national forest utilization standards.

class I airshed: Under the Clean Air Act amendments, all international parks, national parks larger than 6,000 acres, and national wilderness areas larger than 5,000 acres which existed on August 7, 1977. This class provides the most protection to pristine lands by severely limiting the amount of additional air pollution that can be added to these areas.

clearcutting regeneration method. An even-aged regeneration method that removes essentially all trees, producing a fully exposed microclimate for the development of a new age class. Regeneration can be from natural seeding, direct seeding, coppice or planted seedlings (may include minor portions of advance reproduction). When the primary source of regeneration is advance reproduction, the preferred term is overstory removal. A minor live component of the stand may be retained for purposes other than regeneration. The retained trees, referred to as leave trees, should generally comprise less than 10% of full stocking of the stand. The management unit or stand in which regeneration, growth, and yield are regulated consists of the individual clearcut stand.

climax: The final or mature seral stage in secondary plant succession that persists for an indefinite period of time if no major disturbances occur; vegetation conceived as having reached a highly stable condition.

closed canopy: Greater than or equal to 60 percent canopy cover within the moist and cold upland forest potential vegetation groups; greater than or equal to 40 percent canopy cover within the dry upland forest potential vegetation group.

coarse woody material: Pieces of woody material derived from tree limbs, boles, and roots in various stages of decay, having a diameter of at least three inches.

co-conveners: A group of participating county commissioners from within the Planning Area that have served as co-meeting managers for the land management plan revision process and assisted in coordinating the public involvement processes and community collaborative workshops.

Code of Federal Regulations (CFR): A codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the federal government.

cold upland forest: Forests occurring at moderate or high elevations in the subalpine zone characterized by cold, wet winters, and mild, relatively cool and dry summers. Late successional stands are typically dominated by subalpine fir, grand fir, Engelmann spruce, whitebark pine and lodgepole pine. Whitebark pine, lodgepole pine and western larch are more common as early successional species, but they often persist in older stands. Cold upland forests are adjoined by a treeless alpine zone at their upper edge (often separated by a narrow zone of dwarf or krummholz trees), and by moist upland forests at their lower elevation transition boundary.

collaboration: Working together; to cooperate willingly with an agency or instrumentality with which one is not immediately connected.

commercial thinning: Any type of thinning producing merchantable material at least equal to the value of the direct costs of harvesting.

community resiliency: The ability of communities to adapt to changing ecological, social, and economic conditions.

compaction: Making soil hard and dense and decreasing its ability to support vegetation because the soil can hold less water and air and because roots have trouble penetrating the soil.

compatible: Capable of existing together in harmony.

comprehensive evaluation: Evaluation of current social, economic, and ecological conditions and trends relative to the desired conditions and objectives, undertaken prior to plan revision and every five years thereafter.

comprehensive management plan (CMP): The document that establishes the array, levels, and manner of resource uses within the Hells Canyon National Recreation Area on the Wallowa-Whitman National Forest. It is incorporated as a part of the 1990 Land and Resource Management Plan.

connectivity: The arrangement of habitats that allows organisms and ecological processes to move across the landscape; patches of similar habitats are either close together or linked by corridors of appropriate vegetation. Connectivity is the opposite of fragmentation.

conservation strategy or agreement: Plans to remove or reduce threats to candidate and sensitive species of plants and animals so that a listing as threatened or endangered is unnecessary.

consultation: (1) An active, affirmative process that (a) identifies issues and seeks input from appropriate American Indian governments, community groups, and individuals; and (b) considers their interests as a necessary and integral part of the Forest Service's decision-making process; (2) the federal government has a legal obligation to consult with American Indian Tribes. This legal obligation is based in such laws as the Native American Graves Protection and Repatriation Act, the American Indian Religious Freedom Act, and numerous other executive orders and statutes. This legal responsibility is, through consultation, to consider Indian interests and account for those interests in the decision; (3) the term also refers to a requirement under Section 7 of the Endangered Species Act for federal agencies to consult with the U.S. Fish and Wildlife Service

and/or National Oceanic and Atmospheric Administration -Fisheries with regard to federal actions that may affect listed threatened and endangered species or critical habitat.

coppice regeneration method: An even-aged method of regenerating a stand in which the trees in the previous stand are harvested and the majority of regeneration is from sprouts or root suckers. A minor live component of the stand may be retained for purposes other than regeneration. The retained trees, referred to as leave trees, should generally comprise less than 10% of the growing space of the stand.

core area: The combination of core habitat (i.e., habitat that could supply all elements for the long-term security of species of conservation concern) and a core population (a group of one or more local populations that exist within core habitat) constitutes the basic unit on which to gauge recovery within a recovery unit. Core areas require both habitat and the species of conservation concern, and the number (replication) and characteristics of local populations inhabiting a core area provide a relative indication of the core area's likelihood to persist. A core area represents the closest approximation of a biologically functioning unit.

corridor: A tract of land forming a passageway. Can refer to areas of wildlife movement, boundaries along rivers, or the present or future location of transportation or utility rights-of-way within its boundaries.

cost efficiency: The usefulness of specified inputs (costs) to produce specified outputs (benefits). In measuring cost efficiency, some outputs, including environmental, economic, or social impacts, are not assigned monetary values but are achieved at specified levels in the least cost manner. Cost efficiency is usually measured using present net value, although use of benefit-cost ratios and rates-of-return may be appropriate.

Council on Environmental Quality (CEQ): An advisory council to the President established by the National Environmental Policy Act (NEPA) of 1969. The council reviews federal programs for their effects on the environment, conducts environmental studies, and advises the President on environmental matters.

cover: (1) Trees, shrubs, rocks, or other landscape features that allow an animal to conceal itself partly or fully for protection from predators, or to ameliorate conditions of weather, or in which to reproduce; (2) the area of ground covered by plants of one or more species.

cover type: A category or classification of vegetation defined primarily by its vegetation species composition. Cover type is typically depicted in terms of a genus, species, group of species, or life form of tree, shrub, grass, or sedge of an area.

criteria pollutants: Air pollutants designated by the Environmental Protection Agency (EPA) as potentially harmful and for which ambient air standards have been set to protect the public health and welfare. The criteria pollutants are carbon monoxide, sulfur dioxide, particulate matter, nitrogen dioxide, ozone, hydrocarbons, and lead.

crown: The part of a tree containing live foliage; treetops.

cubic feet per second (cfs): A rate of the flow, in streams and rivers, for example. It is equal to a volume of water one foot deep and one foot wide flowing a distance of one foot in one second. One cfs is equal to 7.48 gallons of water flowing each second.

cubic feet per second per square mile (CSM): The rate of streamflow per unit land area.

culmination of mean annual increment (CMAI) (see also mean annual increment): The culmination of mean annual increment of growth is the age in the growth cycle of an even-aged stand at which the average annual rate of increase of volume is at a maximum. In land

management plans, mean annual increment is expressed in cubic measure and is based on the expected growth of stands, according to intensities and utilization guidelines in the plan.

culture: The ideals, values, and beliefs that members of a society share to interpret experience and generate behavior that is reflected by their work and thought (Haviland 2002).

cultural resources: An object or definite location of human activity, occupation, or use identifiable through field survey, historical documentation, or oral evidence. Cultural resources are prehistoric, historic, archaeological, or architectural sites, structures, places, or objects and traditional cultural properties. Cultural resources include the entire spectrum of resources for which the Heritage Program is responsible, from artifacts to cultural landscapes, without regard to eligibility for listing on the National Register of Historic Places

cumulative effects or impacts: Cumulative effects or impacts are the impacts on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Effects and impact are synonymous (40 CFR 1508.7).

current direction: The existing direction in approved management plans; continuation of existing policies, standards and guidelines; current budget updated for changing costs over time; and, to the extent possible, production of current levels and mixes of resource outputs.

D

decommission (building): Demolition, dismantling, removal, obliteration and/or disposal of a deteriorated or otherwise unneeded asset or component, including necessary cleanup work. This action eliminates the deferred maintenance needs for the fixed asset. Portions of an asset or component may remain if they do not cause problems nor require maintenance.

decommission (road): Permanently closing a road to vehicular use and left in a hydrological maintenance free condition. Decommissioning will include activities such as water barring, out sloping, recontouring, decompaction of road surface, removal of drainage structures, and road barricades as needed.

defensible space: An area surrounding a home or structure that has vegetation characteristics that minimize the spread of wildland fire and allows for safely defending the home against fire.

deferred maintenance: Maintenance that was not performed when it should have been or when it was scheduled and which, therefore, was put off or delayed for a future period. When allowed to accumulate without limits or consideration of useful life, deferred maintenance leads to deterioration of performance, increased costs to repair, and decrease in asset value. Deferred maintenance needs may be categorized as critical or noncritical at any point in time. Continued deferral of noncritical maintenance will normally result in an increase in critical deferred maintenance. Code compliance (such as safety, Americans with Disabilities Act, Occupational Safety and Health Administration, or environmental), plan direction, best management practices, biological evaluations other regulatory or executive order compliance requirements, or applicable standards not met on schedule are considered deferred maintenance.

demography: The statistical study of populations, especially with reference to size and density, distributions, and vital statistics such as births, and deaths.

density (stand): An absolute measure of the degree to which an area is occupied by trees and, hence the intensity by which trees are competing for site resources, usually expressed in terms of trees per acre or basal area per acre (Tappeiner 2007).

departure (ecological): The degree of difference between existing ecological conditions and the desired range of conditions.

departure (sale schedule): A sale schedule that deviates from the principle of nondeclining flow by exhibiting a planned decrease in the sale schedule at any time during the planning horizon. A departure is characterized by a temporary increase, usually in the beginning decade(s) of the planning horizon, over the base sale schedule originally established. This increase does not impair the future attainment of desired conditions or the long-term sustained yield capacity.

design criteria: Part Three of the land management plan that provides the parameters, including guidelines, for how future site-specific activities can occur within the context of the plan.

designated critical habitat: Specific areas within the geographical area occupied by a species at the time of listing under Endangered Species Act that contain physical or biological features essential to the conservation of the species.

desired condition:

A desired condition is a description of specific social, economic, or ecological characteristics of the plan area, or a portion of the plan area, toward which management of the land and resources should be directed. Desired conditions must be described in terms that are specific enough to allow progress toward their achievement to be determined, but do not include completion dates.

detrimental soil disturbance: A term used by soil scientists to indicate how much adverse soil-movement has occurred in an area following an event or a managed activity. The level of disturbance (considered to be a negative impact) is referred to in four erosion hazard classes: low, medium, high, and very high. The differences between the levels depends upon many subjective visual observations soil scientists have been trained to make during site surveys. These include:

1) the amount of topsoils buried beneath subsoils,

2) the redistribution of soil orders and whether or not nutrients needed for plant growth are lost,

3) the amount of vegetation left remaining on and in the soil,

4) how slope, aspect, and hydrology are altered, and

5) whether the disturbance is further impacted by compaction, or other landform changes (i.e., bank failure, landslides, etc.).

developed recreation: Recreation that requires facilities that in turn result in concentrated use of an area; for example, a campground. Examples of developed recreation areas are campgrounds and ski areas; facilities in these areas might include roads, parking lots, picnic tables, toilets, drinking water, ski lifts, and buildings.

developed site: Facility provided for developed recreation use. Refer to facilities.

diameter at breast height (d.b.h.): A standard method of expressing the diameter of the bole of a standing tree, measured at 4.5 feet from the ground.

direct effects: Impacts on the environment caused by the action and occur at the same time and place.

disease: A harmful deviation from normal functioning of physiological processes, usually pathogenic or abiotic in origin.

disjunct: Populations that are separated geographically from the main distribution of a species. Many plants with disjunct populations are biologically unique because they are not found again for dozens to over one hundred miles. Disjunct populations are thus rare in this portion of their distribution.

dispersed (recreation): Recreation that does not occur in a developed recreation site; for example, hunting or backpacking.

dispersed campsites: Primitive sites typically used for overnight, dispersed recreation. Usually includes a hardened area around a fire pit, a barren area, and/or user-constructed facility.

displacement: Recreation visits are considered "displaced" or no longer consumed at a site or area when practical maximum capacity thresholds of the site or area are exceeded. Visitors are assumed to completely leave the national forest rather than seek an alternative location for their activity.

disturbance: Any relatively discrete event in time that disrupts ecosystem, watershed, community, or species population structure and/or function and changes resources, substrate availability, or the physical environment. Natural disturbances include, among others, drought, floods, wind, fires, volcanic eruptions, and insects and diseases. Human caused disturbances include, among others, timber harvesting, livestock grazing, and prescribed burning.

disturbance regime: A description of the characteristic types of disturbance on a given landscape; the frequency, severity, and size distribution of these characteristic disturbance types; and their interactions. Disturbance regime refers to the spatial and temporal dynamics of disturbances over a longer time period.

diversity: The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan.

down woody material: A tree or part of a tree that is dead and laying on the ground.

dry upland forest: Forests generally occurring at low to moderate elevations in the montane vegetation zone, characterized by warm, dry summers, with warm to hot daytime temperatures and cool nighttime temperatures, and cold, wet winters. Late-seral stands are dominated by ponderosa pine, Douglas-fir or grand fir. Ponderosa pine or Douglas-fir will also be found as cover types in early and mid-seral successional stages. Dry forests generally begin where the lower elevation woodlands and shrublands begin to transition into higher sites capable of carrying more substantial forest cover. The moist upland forests form their upper elevation transition boundary.

E

early seral: see succession.

early spring: Early spring is defined as that period when the perennial cool–season forage plants initiate growth and begin shoot elongation. It extends through the period of maximum carbohydrate use and the beginning of carbohydrate storage. The end of this period is determined by soil moisture. It ends prior to the time that soil moisture is expected to become limiting to the extent that essentially full regrowth cannot be ensured.

Eastside Screens: Regional Forester's Amendment #2, Interim management direction establishing riparian, ecosystem, and wildlife standards for timber sales on National Forest System lands in eastern Oregon and Washington (USDA Forest Service 1995).

ecological function: Refer to ecological processes.

ecological integrity: The quality or condition of an ecosystem when its dominant ecological characteristics (for example, composition, structure, function, connectivity, and species composition and diversity) occur within the natural range of variation and can withstand and recover from most perturbations imposed by natural environmental dynamics or human influence. (36 CFR 219.19).

ecological processes: The flow and cycling of energy, materials, and organisms in an ecosystem. Examples of ecosystem processes include the carbon and hydrologic cycles, terrestrial and aquatic food webs, and plant succession, among others.

ecological status: The degree of departure of current vegetation from the potential natural vegetation, or potential natural community often synonymous with seral stage.

economics: A social science concerned primarily with description, distribution, and consumption of goods and services.

economic well-being: A condition that enables people to work, provide income for their families, and generate economic wealth to local communities, the region, and the nation.

economic efficiency: Producing goods and services in areas best suited for that production based on natural biophysical advantage or an area's ability to best serve regional demands of people.

economic impacts:

> **direct economic impact:** Effects caused directly by forest product harvest or processing or by forest uses.
>
> **indirect economic impact:** Effects that occur when supporting industries sell goods or services to directly affected industries.
>
> **induced economic impact:** Effects that occur when employees or owners of directly or indirectly affected industries spend their income within the economy.

economy: System of production, distribution, and consumption of economic goods.

ecosystem: A complete, interacting system of living organisms and the land and water that make up their environment; the home places of all living things, including humans.

ecosystem diversity: The variety and relative extent of ecosystem types, including their composition, structure, and processes within all or a part of an area of analysis.

ecosystem management: The use of an ecological approach to achieve multiple-use management of public lands by blending the needs of people and environmental values in such a way that lands represent diverse, healthy, productive, and sustainable ecosystems.

ecosystem function (processes): The major process of ecosystems that regulate or influence the structure, composition, and pattern. These include nutrient cycles, energy flows, trophic levels (food chains), diversity patterns in time/space development and evolution, cybernetics (control), hydrologic cycles and weathering processes.

ecosystem health: A condition where the parts and functions of an ecosystem are sustained over time and where the system's capacity for self-repair is maintained, such that goals for uses, values, and services of the ecosystem are met.

ecosystem services: The combined resources and processes of natural ecosystems that provide benefit to humans, including, but not limited to, the production of food and water, the control of climate and disease, cycling of nutrients and crop pollination, spiritual and recreational benefits, and the preservation or maintenance of biodiversity.

ecosystem sustainability: The ability to sustain diversity, productivity, resilience to stress, health, renewability and/or yield of desired values, resource uses, products, or services from an ecosystem, while maintaining the integrity of the ecosystem over time.

edge: An area where plant communities meet or where successional stages or vegetation conditions within the plant communities come together.

effects: Environmental changes resulting from an action. Included are direct effects, which are caused by the action and occur at the same time and place, and indirect effects, which are caused by the action and are later in time or further removed in distance, but which are still reasonably foreseeable. Indirect effects may include growth–inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems, including ecosystems.

Effects include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic quality, historic, cultural, economic, social, or healthy effects, whether direct, indirect, or cumulative. Effects may also include those resulting from actions that may have both beneficial and detrimental effects even if on balance the agency believes that the effects will be beneficial (40 CFR 1508.8, 2).

eligible wild and scenic rivers: River segments that have been identified as eligible for inclusion in the national Wild and Scenic Rivers System under the authority of the Wild and Scenic Rivers Act. The river segment must be free-flowing and it must possess one or more outstandingly remarkable scenic, recreational, geological, fish and wildlife, historical, cultural, ecological or other value.

elk security: Effective security for elk includes non-linear areas that are greater than one-half mile from open motorized routes and at least 250 acres in size (Hillis et al. 1991).

embeddedness: The degree that larger streambed particles (boulders, rubble, or gravel) are surrounded or covered by finer particle sizes such as fine sediment (Rhodes et al. 1994).

emission: A release of air contaminants into the outdoor atmosphere.

endangered species: Species listed under the Endangered Species Act by either the U.S. Fish and Wildlife Service or the National Marine Fisheries Service. Any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range.

endemic: Occurring naturally in a certain region and distribution. Populations nearly always present, often remaining at low levels, and causing little management concern. Endemism is the occurrence of endemic species in an area.

environmental assessment (EA): A comprehensive evaluation of actions and their predictable short– and long–term environmental effects, which include physical, biological, economic, social, and environmental design factors and their interactions. It is a formal document that must follow the requirements of National Environmental Policy Act, the Council on Environmental Quality, and guidelines and directives of the agency responsible for the project proposal.

environmental impact statement (EIS): A statement of the environmental effects of a proposed action and alternatives to it. It is required for major federal actions under Section 102 of the National Environmental Policy Act, and released to the public and other agencies for comment

and review. A draft environmental impact statement is released to the public and other agencies for review and comment. A final environmental impact statement is issued after consideration of public comments. A record of decision is based on the information and analysis in the final environmental impact statement.

ephemeral: A channel in which streamflow occurs inconsistently, infrequently, or seasonally and, except during periods of streamflow, does not intersect the local groundwater table.

erosion: The wearing away of the land surface by running water, wind, ice, gravity, or other geological activities; can be accelerated or intensified by human activities that reduce the stability of slopes or soils.

essential fish habitat: Identification by the National Marine Fisheries Service of habitat essential to conserve and enhance federal fishery resources that are fished commercially under the Magnuson-Stevens Fishery Conservation and Management Act.

evaluation: An essential companion activity to monitoring; the tool for translating data gathered by monitoring into useful information that could result in change or adaptive management.

even-aged management: The application of a combination of actions that results in the creation of stands in which trees of essentially the same age grow together. Managed even-aged forests are characterized by a distribution of stands of varying ages (and, therefore, tree sizes) throughout the forest area. The difference in age between trees forming the main canopy level of a stand usually does not exceed 20 percent of the age of the stand at harvest rotation age. Regeneration in a particular stand is obtained during a short period at or near the time that a stand has reached the desired age or size for regeneration and is harvested. Clearcut, shelterwood, seed tree, or coppice regeneration cutting methods produce even-aged stands.

evolutionarily significant units (ESU): The minimal unit of conservation management, the smallest population unit that can receive federal protection under the Endangered Species Act. An ESU is a set of populations that is morphologically and genetically distinct from other similar populations or a set of populations with a distinct evolutionary history.[34]

exotic species: A plant or animal species introduced from a distant place; not native to the area.

extinction: Complete disappearance of a species from the earth.

extirpation: Loss of populations from all or part of a species' range within a specified area.

F

facility: A single or contiguous group of improvements that exists to shelter or to support Forest Service programs. The term may be used in either a broad or narrow context; for example, a facility may be a ranger station compound, lookout tower, leased office, work center, separate housing area, visitor center, research laboratory, recreation complex, utility system, or telecommunications site.

> **upgrade:** Total redesign and construction of a camping facility. Location may change considerably depending on ecological, environmental, or social concerns. The overall goal would be to maintain a rustic appearance but promote designs and materials that would result in lower operation and maintenance costs. Some campground classifications may change to the next higher level but none would exceed a Level 4 site development for this planning period. Accessibility standards would be appropriate to the designated Recreation

[34] http://darwin.eeb.uconn.edu/eeb310/lecture-notes/systematics/systematicsli3.html

Opportunity Spectrum. A change in design standards has the potential to move the ROS to a higher development setting although that is not the intent of upgrading a facility.

facilities maintenance (annual): Work performed to maintain serviceability, or repair failures during the year in which they occur. Includes preventive and/or cyclic maintenance performed in the year in which it is scheduled to occur. Unscheduled or catastrophic failures of components or assets may need repaired as a part of annual maintenance.

preventive maintenance: Scheduled servicing, repairs, inspections, adjustments, and replacement of parts that result in fewer breakdowns and fewer premature replacements, and help achieve the expected life of the fixed asset. Inspections are a critical part of preventive maintenance as they provide the information for scheduling maintenance and evaluating its effectiveness.

facilities maintenance (deferred): Work that was not performed when it should have been or when it was scheduled and has been delayed to a future period. Deferred maintenance includes actions not taken to comply with codes for health and safety, accessibility, environmental factors and other compliance requirements or applicable standards. To reduce or eliminate deferred maintenance, rehabilitation or replacement may be necessary.

rehabilitation: Renovation or restoration of an existing fixed asset or any of its components in order to restore the functionality or life of the asset. Because there is no significant expansion or change of purpose for the fixed asset, the work primarily addresses deferred maintenance.

replacement: Substitution or exchange of an existing fixed asset or component with one having essentially the same capacity and purpose.

custodial: Replacement of nonfunctional site elements or facilities with in–kind materials or structures. Location, design, and configuration remain constant. Accessibility standards, where possible, are compatible with designated ROS settings.

decommission: Demolition, dismantling, removal, obliteration, and/or disposal of a deteriorated or otherwise unneeded asset or component, including necessary cleanup work. This action eliminates the deferred maintenance needs for the fixed asset. Portions of an asset or component may remain if they do not cause problems nor require maintenance.

fauna: The vertebrate and invertebrate animals of an area or region.

fall/winter season: This period basically begins when all key perennial forage plants have achieved dormancy. It runs through the dormant period and ends just before the initiation of new growth on the key cool season perennial forage species in the spring. In very general terms, this often begins in mid to late October and runs through February, March, or April depending on the elevation, aspect and the weather patterns for a given year.

farm/forest/grazing use: Any traditional agricultural, silvicultural, or livestock management use or combination thereof on farm/forest/grazing lands. This includes, but is not limited to, true farming, growing and harvesting timber, grazing of livestock, horticultural use, animal husbandry use, horse, cattle, and sheep ranching, and preparation and storage of the products raised on farm/forest/grazing land for on-site use of for disposal by marketing or otherwise. Farm/forest/grazing uses may also consist of uses related, to, and in furtherance of, the protection of fish and wildlife habitat, and the pursuit of recreational activities.

federally listed species: Species that are listed under the Endangered Species Act.

fine organic matter: Plant litter, duff, and woody material less than 3 inches in diameter.

fine-scale: A generally high level of landscape resolution involving greater levels of detail and relatively small areas.

fire cycle, fire frequency: Refer to fire return interval.

fire-dependent systems: Forests, grasslands, and other ecosystems historically composed of species of plants that evolved with and are maintained by fire regimes.

fire intensity: The energy output from a fire or the amount of energy or heat released per unit of time; can be expressed as reaction intensity, fireline intensity, temperature, heating duration, or radiant energy

fire intolerant: Species of plants with characteristics that render them relatively more prone to significant damage or mortality from the effects of a given frequency and intensity of fire.

fire management plan: A plan that identifies and integrates all wildland fire management and related activities within the context of approved land/resource management plans. It defines a program to manage wildland fires (wildfire, prescribed fire, and wildland fire use). The plan is supplemented by operational plans, including but limited to preparedness plans, preplanned dispatch plans, and prevention plans. Fire management plans assure that wildland fire management goals and components are coordinated.

fire regime: The characteristics of fire in a given ecosystem, such as the frequency, predictability, intensity, and seasonality of fire. A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention but including the influence of aboriginal burning (Agee 1993; Brown 1995). Coarse-scale definitions for natural fire regimes were developed by Hardy and others (2001) and Schmidt and others (2002) and interpreted for fire and fuels management by Hann and Bunnell (2001). The five natural fire regimes are classified based on the average number of years between fires (fire frequency or Mean Fire Interval [MFI]) combined with the severity of the fire (the amount of vegetation replacement) and its effect on the dominant overstory vegetation. These five natural fire regimes are as follows:

> **fire regime 1:** 0- to 35-year frequency and of low severity (most commonly associated with surface fires) to mixed severity (in which less than 75 percent of the dominant overstory vegetation is replaced).
>
> **fire regime 2:** 0- to 35-year frequency and of high severity (stand replacement: greater than 75 percent of the dominant overstory vegetation is replaced).
>
> **fire regime 3:** 35- to 200-year frequency and of mixed severity.
>
> **fire regime 4:** 35- to 200-year frequency and of high severity.
>
> **fire regime 5:** 200-year-plus frequency and of high severity.

fire regime condition class (FRCC): A classification of the degree of departure from the natural fire regime. The fire regime condition class classification is based on a relative measure describing the degree of departure from the historical natural fire regime. This departure can result in changes (or risks) to one, or more, of the following ecological components: vegetation (species composition, structural stages, stand age, canopy cover, and mosaic pattern across the landscape); fuel composition; fire frequency, severity, and pattern; and other associated disturbances.

condition class 1: Fire regimes are within the natural (historical) range, and the risk of losing key ecosystem components is low. Vegetation attributes (species composition, structure, and pattern) are intact and functioning within the natural (historical) range.

condition class 2: Fire regimes have been moderately altered from their natural (historical) range. Risk of losing key ecosystem components is moderate. Fire frequencies have departed from natural frequencies by one or more return intervals (either increased or decreased). This result in moderate changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation and fuel attributes have been moderately altered from their natural (historical) range.

condition class 3: Fire regimes have been substantially altered from their natural (historical) range. The risk of losing key ecosystem components is high. Fire frequencies have departed from natural frequencies by multiple return intervals. Dramatic changes occur to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been substantially altered from their natural (historical) range.

fire return interval: The average time between fires in a given area.

fire severity: Degree to which a site has been altered or disrupted by fire; loosely, a product of fire intensity and residence time.

- Low-severity fire, meaning less than 25 percent average vegetation top-kill
- Mixed-severity fire, meaning greater than 25 and less than 75 percent average vegetation top-kill
- High-severity fire, meaning greater than 75 percent average vegetation top-kill

fire suppression: All work and activities connected with fire-extinguishing operation, beginning with discovery and continuing until the fire is completely extinguished.

fire-tolerant: Species of plants that have various characteristics which render them relatively less prone to significant damage or mortality from a given frequency and intensity of fire.

fish-producing: Streams, rivers, wetlands, ponds, lakes, and reservoirs that serve as spawning or rearing habitat for fish.

fledgling: A young bird that has acquired the feathers necessary for flight.

floodplain: The lowland and relatively flat areas joining inland and coastal waters including debris cones and flood-prone areas of off-shore islands, including at a minimum, that area subject to a one percent (100-year recurrence) or greater chance of flooding in any given year (Executive Order 11988, Section 6c); or the area of relatively flat land adjacent to streams that is inundated during times of high flow; or an area formed by the deposition of stream-transported sediment.

floodplain function: Collectively, the normal physical and biological processes that are responsible for the formation and maintenance of river floodplains and the biotic communities that inhabit them.

flow regime: The range of magnitude, duration, timing and frequency of stream flow characteristics of a given stream.

focal species: A small subset of species whose status permits inference to the integrity of the larger ecological system to which it belongs and provides meaningful information regarding the effectiveness of the Plan in maintaining or restoring the ecological conditions to maintain the

diversity of plant and animal communities in the Plan Area. Focal species would be commonly selected on the basis of their functional role in ecosystems.

food web: Networks of food chains or feeding relationships by which energy and nutrients are passed from one group of living organisms to another.

forb: Broad-leafed, herbaceous, nongrass-like plant species other than true grasses, sedges, and non–woody plants; fleshy leafed plants; having little or no woody material.

forage: All browse and herbaceous foods that are available to grazing animals. It may be grazed or harvested for feeding. Refer to rangeland vegetation.

forest vegetation treatment: (synonym for silvicultural treatment) A forest management activity such as thinning, harvesting, planting, pruning, prescribed burning, mastication, or site preparation that is designed to alter the establishment, growth, composition, health, and/or quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis.

forest fragmentation: Refer to fragmentation.

forest health: The perceived condition of a forest derived from concerns about such factors as its age, structure, composition, function, vigor, presence of unusual levels of insects and disease and resilience to disturbance. Perception and interpretation of forest health are influenced by individual and cultural viewpoints, land management objectives, spatial and temporal scales, the relative health in stands that comprise the forest, and the appearance of the forest at a point in time.

forest land: Land at least 10 percent occupied by forest trees of any size or formerly having had such tree cover and not currently developed for non-forest use. Lands developed for non-forest use include areas for crops, improved pasture, residential, or administrative areas, improved roads of any width, and adjoining road clearing and powerline clearing of any width.

forest roads: Any road wholly or partly within, or adjacent to, and serving the national forest and which is necessary for the protection, administration, and utilization of the national forests and the use and development of its resources (23 USC 101).

Forest Service Handbook (FSH): Directives that provide detailed instructions on how to proceed with a specialized phase of a program or activity.

Forest Service Manual (FSM): A system of manuals that provides direction for Forest Service activities.

forest transportation facility: A classified road, designated trail, or designated airfield, including bridges, culverts, parking lots, log transfer facilities, safety devices and other transportation network appurtenances under Forest Service jurisdiction that is wholly or partially within or adjacent to National Forest System lands (36 CFR 212.1).

forest transportation system management: The planning, inventory, analysis, classification, record keeping, scheduling, construction, reconstruction, maintenance, decommissioning, and other operations undertaken to achieve environmentally sound, safe, cost-effective access for use, protection, administration, and management of national forest lands.

fragmentation (habitat): The break-up of a large continuous land area by reducing and dividing into smaller patches isolated by areas converted to a different land type. Habitat can be fragmented by natural events or development activities.

fragmentation (forest): The breakup of a large land forest area into smaller patches isolated by areas converted to a different land type. Opposite of connectivity.

free-flowing: A river or stream that exists or flows in natural condition without impoundment, diversion, straightening, rip-rapping, or other modification of the waterway (16 U.S.C. §1286).

fuel: Plants or plant parts, both living and dead, capable of burning.

fuel load: The dry weight of combustible forest fuels per unit area; usually expressed as tons per acre.

fuel treatment: Any forest vegetation treatment which alters the continuity, rearranges, or removes forest fuels primarily for the purpose of modifying potential fire behavior and/or lessening resistance to control tactics.

functioning-at-risk: Riparian-wetland areas that are in functional condition but an existing soil, water, or vegetation attribute makes them susceptible to degradation.

G

geographic information system (GIS): An information processing technology to input, store, manipulate, analyze, and display data; a system of computer maps with corresponding site-specific information that can be combined electronically to provide reports and maps.

geologic: Based on geology which is the study of the structure, processes, and chronology of the earth.

geological/geomorphic process: The actions or events that shape and control the distribution of materials, their states, and their morphology, within the interior and on the surface of the earth. Examples of geologic processes include: volcanism, glaciation, streamflow, metamorphism (partial melting of rocks), and landsliding.

goal: Goals are broad statements of intent, other than desired conditions, usually related to process or interaction with the public. Goals are expressed in broad, general terms, but do not include completion dates.

goods and services: The various outputs, including on-site uses, produced from forest and rangeland resources.

government-to-government consultation: The active and continuous process of contacting tribal leadership, soliciting their participation, involvement, comments, concerns, contributions, and traditional knowledge that will assist the agency in making informed decisions in planning, managing and decision-making actions.

graminoid: Grasses and grass-like plants such as sedges and rushes.

grassland: Land on which the vegetation is dominated by grasses, grass-like plants, or forbs.

grazable forestland: Forestland that produces, at least periodically, understory vegetation that can be grazed. In this document, that condition is defined as any forested site with an existing overstory canopy cover less than 60 percent with greater than about 200 pounds of forage production per year per acre.

grazing: The consumption of standing forage by livestock or wildlife.

grazing allotment: Area designated for the use of a certain number and kind of livestock for a prescribed period.

grazing lands: Any vegetated land that is grazed or has the potential to be grazed by animals (domestic or wild). This includes rangeland and grazable forestland.

grazing permit: Document authorizing livestock to use national forest lands or other lands under Forest Service control for livestock production.

ground fire: A fire that burns the organic material in the soil layer and the decayed material or peat below the ground surface.

groundwater: All of the water that has percolated through the surface soil into the bedrock.

groundwater-dependent ecosystems: Communities of plants, animals, and other organisms whose extent and life processes are dependent on access to or discharge of groundwater. (USDA Forest Service 2012)

group selection regeneration method: A method of regenerating uneven-aged stands in which trees are harvested in small groups, and new age classes are established. The width of groups is commonly approximately twice the height of the mature trees, with smaller openings providing microenvironments suitable for tolerant regeneration, and the larger openings providing conditions suitable for more intolerant regeneration. In the group selection regeneration method, the management unit or stand in which regeneration growth and yield are regulated consists of a landscape containing an aggregation of groups.

guideline: A guideline is a constraint on project and activity decisionmaking that allows for departure from its terms, so long as the intent of the guideline is met. (36 CFR 219.15(d)(3)). Guidelines are established to help achieve a desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

H

habitat: A place that provides seasonal or year-round food, water, shelter, and other environmental conditions for an organism, community, or population of plants or animals.

harvest (timber): The removal of trees for wood fiber use and other multiple-use purposes.

harvest (wildlife): removal of game animals or fish from a population, typically by hunting or fishing.

harvestable/harvestability: With regard to American Indian Tribes, refers to a population of plants or animals that is self-sustaining and capable of producing a dependable harvest annually to meet spiritual, cultural, subsistence, and commercial needs.

head month: One month's use and occupancy of the range by one animal. For grazing fee purpose, it is a month's use and occupancy of range by one weaned or adult cow with or without calf, bull, steer, heifer, horse, burro, or mule, or five sheep or goats. Refer to animal unit month.

headwaters: Beginning of a watershed; the uppermost, unbranched tributaries of a stream.

healthy ecosystem: An ecosystem in which structure and functions allow the maintenance of the desired conditions of biological diversity, biotic integrity and ecological processes over time.

Hells Canyon National Recreation Area Act: The Act of December 31, 1975, as amended (PL 94-199, 89 Statute 117), which established the Hells Canyon National Recreation Area.

herbaceous: Green and leaf-like in appearance or texture; includes grasses, grass-like plants, and forbs, with little, or no woody component.

herbicide: A pesticide used for killing or controlling the growth of plants.

herbivore: An animal that subsists on plants or plant materials, either primarily or entirely.

heterogeneous: quality of consisting of dissimilar or diverse elements, as with mixed habitats or cover types occurring on a landscape; opposite of homogeneous, in which elements are the same.

hibernacula: Habitat niches where certain animals (such as bats) overwinter, such as caves, mines, tree hollows, or loose bark.

hiding cover: Vegetation, primarily trees, capable of hiding 90 percent of a standing adult game animal from the view of a human at a distance equal to or less than 200 feet during all seasons of the year that elk or deer use the area. Generally, any vegetation used for security or to escape from danger.

high-severity fire: see fire severity.

historical conditions: see historical range of variability

historic property: Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian Tribe or Native Hawaiian organization and that meet the National Register of Historic Places criteria.

historical range of variability (HRV): The variation of ecological characteristics and processes over scales of time and space that are appropriate for a given management application. The historical range of variability concept focuses on a distilled subset of past ecological knowledge developed for use by resource managers; it represents an explicit effort to incorporate a past perspective into management and conservation decisions. The pre-European influenced reference period considered is sufficiently long, often several centuries, to include the full range of variation produced by dominant natural disturbance regimes such as fire and flooding and also includes short-term variation and cycles in climate. The historical range of variability can help identify key structural, functional, compositional, and connectivity characteristics, for which plan components may be important for either maintenance or restoration of such ecological conditions.

homogeneous: quality of consisting of similar or standardized elements, as with uniform habitats or cover types occurring on a landscape; opposite of heterogeneous, in which elements are diverse and mixed.

human capital: An individual's education, skills, culture, and knowledge that enhance their contributions to society (Castle 1998).

human-caused disturbance: Refer to disturbance.

hydroelectric: Of or relating to the production of electricity by waterpower.

hydrologic: Refers to the properties, distribution, and effects of water. Hydrology refers to the broad science of the waters of the earth, their occurrence, circulation, distribution, chemical and physical properties, and their reaction with the environment.

hydrologic function: The behavioral characteristics of a watershed described in terms of ability to sustain favorable conditions of water flow. Favorable conditions of water flow are defined in terms of water quality, quantity, and timing.

hydrological regimes: The spatiotemporal dynamics of water flow and associated fluvial process in an ecosystem. Refer to flow regime.

hydrologic unit: A hydrologic unit is a drainage area delineated to nest in a multi-level, hierarchical drainage system. Its boundaries are defined by hydrographic and topographic criteria that delineate an area of land upstream from a specific point on a river, stream or similar surface waters. A hydrologic unit can accept surface water directly from upstream drainage areas, and indirectly from associated surface areas such as remnant, noncontributing, and diversions to form a drainage area with single or multiple outlet points.

hydrologic unit code (HUC): A hierarchical coding system developed by the U.S. Geological Survey to identify geographic boundaries of watersheds of various sizes (12).

4th-code HUC refers a subbasin generally about 450,000 acres in size.

5th-code HUC refers to a watershed. These areas generally range from 40,000 to 250,000 acres in size.

6th-code HUC refers to a subwatershed hydrologic unit that generally ranges from 10,000 to 40,000 acres in size.

I

impacts: Refer to effects.

Impact Analysis for Planning (IMPLAN) Model: A computer–based system used by the Forest Service for constructing input-output models to measure economic input. The system includes a database for all counties in the United States and a set of computer programs to retrieve data and perform the computational tasks for input-output analysis.

implement: To carry out.

improvement cutting: An intermediate treatment made in a stand, pole-sized or larger, primarily to improve composition and quality by removing less desirable trees of any species.

indirect effects: Impacts on the environments that are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable.

inert ingredient: An ingredient deficient in active properties, lacking the usual or anticipated chemical or biological action.

infestation: The attack or invasion by parasites or pests.

infiltration: The process by which water seeps into the soil, influenced by soil texture, aspect, and vegetation cover.

infrastructure: The basic facilities, equipment, and installation needed for the functioning of a system; commonly refers to items such as roads, bridges, power facilities, and the like.

INFISH: Regional Forester's Amendment 4, Inland Native Fish Strategy (USDA Forest Service 1995). Interim strategies for managing fish–producing watersheds in Eastern Oregon and Washington, Idaho, Western Montana and portions of Nevada.

insecticide: A pesticide employed against insects.

instream flow: Flow of water in its natural setting (as opposed to waters diverted for off-stream uses such as industry or agriculture). Instream flow levels provided for environmental reasons enhance or maintain the habitat for riparian and aquatic life, with timing and quantities of flow characteristic of the natural setting.

integrated pest management: A process for selecting strategies to regulate forest pests in which all aspects of a pest-host system are studied and weighed. The information considered in selecting appropriate strategies includes the impact of the unregulated pest population on various resources values, alternative regulatory tactics and strategies, and benefit/cost estimates for these alternative strategies. Regulatory strategies are based on sound silvicultural practices and ecology of the pest-host system and consist of a combination of tactics such as timber stand improvement plus selective use of pesticides. A basic principle in the choice of strategy is that it be ecologically compatible or acceptable.

integration: Bringing the values and systems of different disciplines together to address questions with a common framework using consistent techniques and measurement units.

interagency: Involving the Forest Service, Bureau of Land Management, Fish and Wildlife Service, National Marine Fisheries Service, Environmental Protection Agency, and/or other Federal agencies.

interdisciplinary team: A group of specialists assembled as a cohesive team with frequent interactions to solve a problem or perform a task.

intermediate harvest treatment: A collective term for any harvest treatment or tending designed to enhance growth, quality, vigor, and composition of the stand after establishment or regeneration and prior to final regeneration harvest.

intermittent stream: A stream in which the flow of water on the surface is discontinuous, or that alternates between zones of surface and sub-surface flow.

invasion (plant): The movement of a plant species into a new area outside its former range.

invasive nonnative species: Are those animal and plant species with an extraordinary capacity for multiplication and spread at the expense of other native species. Plants in this category may or may not be designated as noxious weeds.

invasive plant species: Nonnative plant species that invade or are introduced into an environment or ecosystem in which they did not evolve where they have the ability to compete with, and at times overshadow, the existing native plant species. Invasive species are also likely to cause economic or environmental harm or harm to human health. Invasive species include seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem (with respect to a particular ecosystem). Noxious weeds are a specific type of invasive plants that carry a legal designation due to their potential for detrimental impacts to the environment.

inventoried roadless areas: Those areas identified in the Land Management Plan and listed on a set of inventoried roadless area maps, contained in Forest Service Roadless Area Conservation, Final Environmental Impact Statement, Volume 2, (USDA Forest Service 2000), which are held at the Washington Office of the Forest Service, or any update, correction, or revision of those maps through the land management planning process.

invertebrate: Small animals that lack a backbone or spinal column. Spiders, insects, and worms are examples of invertebrates.

irretrievable commitment: Applies to losses of production or commitment of renewable natural resources. For example, while an area is used as a ski area, some or all of the timber production there is “irretrievably” lost. If the ski area closes, timber production could resume; therefore, the loss of timber production during the time the area is devoted to skiing is irretrievable but not

irreversible, because it is possible for timber production to resume if the area is no longer used as a ski area.

irreversible commitment: Applies to nonrenewable resources, such as minerals and archaeological sites. Losses of these resources cannot be reversed. Irreversible effects can also refer to effects of actions on resources that can be renewed only after a very long period, such as the loss of soil productivity.

issue: A point, matter of controversy, dispute, question of public discussion, or general concern over resource management activities or land uses to be addressed or decided through the planning process. To be considered a significant environmental impact statement issue, it must be well defined, relevant to the proposed action, and within the ability of the agency to address through alternative management strategies.

K

key habitat: Specific areas within the geographic area occupied by the species on which are found those physical and biological features 1) essential to the conservation of the species, and 2) which may require special management considerations or protection.

key species/key forage species: (1) Forage species whose use serves as an indicator to the degree of use of associated species. (2) Those species which must, because of their importance, be considered in the management program.

keystone species: A species whose presence and role within an ecosystem has a disproportionate on other organisms within the system.

L

landform: One of the attributes or features that make up the Earth's surface such as a plain, mountain, or valley, as defined by its particular combination of bedrock and soils, erosion processes, and climatic influences.

land management plan: A document or set of documents that provide management direction for an administrative unit of the National Forest System developed under the requirements of the land management planning regulation at 36 CFR part 219 or a prior planning rule.

landscape: A defined area irrespective of ownership or other artificial boundaries, such as a spatial mosaic of terrestrial and aquatic ecosystems, landforms, and plant communities, repeated in similar form throughout such a defined area.

landscape character: Identifiable image made by particular attributes, qualities, and traits of a landscape.

landscape ecology: The study of the interaction between spatial pattern and ecological processes, that is, the causes and consequences of spatial heterogeneity across a range of scales (Turner et al. 2001).

landscape-level/landscape-scale: Refer to broad-scale.

landscape pattern: Number, frequency, size and juxtaposition of landscape elements (stands and patches) that are important to the determination or interpretation of ecological processes.

landscape structure: The mix and distribution of stand or patch sizes across a given area of land. Patch sizes, shapes, and distributions are a reflection of the major disturbance regimes operating on the landscape.

land-use allocation: The commitment of a given area of land or a resource to one or more specific uses--for example, to campgrounds or wilderness.

late/old structure (LOS): Term used by the interim wildlife standard or the Regional Forester's Eastside Plan Amendment No. 2 (Eastside Screens) generally referring to forest structural stages where large trees are common. Under the Eastside Screens, late and old structural stages can be either "multi-strata with large trees" or "single-stratum with large trees." In the multi-strata with large trees stage, large trees are common, and several to many cohorts and strata of trees are present. In the single-stratum with large trees stage, large trees are common and a single stratum of large trees is present and young trees are absent or few in the understory. Late old structural stages are roughly analogous to the "old forest" structural stages characterized by this FEIS. These structural stages may or may not contain the various characteristics sometimes identified with old growth structure.

late seral: see succession.

late successional: The stage of ecological succession and type of vegetation that develops after a long period of time following a stand-replacing disturbance.

legacy tree: Old trees that have been spared during past harvest, or have survived stand replacing natural disturbances, and are thus significantly older than the average trees in the general area. This distinguishes them from other 'residual' trees, which may also have been spared from harvest but are not always significantly older than the average trees in the area (Mazurek and Zielinski 2004; Franklin 1990).

lethal (stand-replacing) fires: Fires that result in stand replacement of the existing forested vegetation. Mortality levels are very high at all canopy levels within the stand. In forests, fires in which less than 20 percent of the basal area or less than 10 percent of the canopy cover remains; in rangelands, fires in which most of the shrub overstory or encroaching trees are killed.

lichens: Organisms made up of specific algae and fungi, forming identifiable crusts on soil, rocks, tree bark, and other surfaces. Lichens are primary producers in ecosystems; they contribute living material and nutrients, enrich the soil and increase soil moisture-holding capacity, and serve as food sources for certain animals. Lichens are slow growing and sensitive to chemical and physical disturbances.

litter: The uppermost layer of organic debris on the soil surface, which is essentially the freshly fallen or slightly decomposed vegetation material such as stems, leaves, twigs, and fruits.

limits of acceptable change (LAC): Process for establishing acceptable resource and social conditions while defining desired future conditions for wilderness or recreation settings that can be measured and managed (USDA Forest Service 1992).

local population: A group of individuals that spawn or breed in a particular area; the smallest group of individuals that is known to represent an interacting reproductive unit.

loess: Fine grained wind-deposited material predominantly of silt-size particles.

long term: Generally refers to a period longer than 10 years up to 100 years.

long-term sustained yield timber capacity: The highest uniform wood yield from lands being managed for timber production that may be sustained under a specified management intensity consistent with multiple-use objectives.

lower montane: A terrestrial community that generally is found in drier and warmer environments than the montane terrestrial community. The lower montane community supports a unique clustering of wildlife species.

M

mainstem: The main channel of the river in a river basin, as opposed to the streams and smaller rivers that feed into it.

maintain: To continue; or keep ecosystem functions, processes, and/or components (such as soil, air, water, vegetation) in such a condition that the ecosystem's ability to accomplish current and future management objectives is not weakened. Management activities may be compatible with ecosystem maintenance if actions are designed to maintain or improve current ecosystem condition.

major population group: A group of either salmon populations or group of steelhead populations that are geographically and genetically cohesive. The major population group is a level of organization between demographically independent populations and evolutionarily significant units or distinct population segments.

management area: A land area identified within the Planning Area that has the same set of applicable plan components. A management area does not have to be spatially contiguous.

management concern: An issue, problem, or a condition which constrains the range of management practices identified by the Forest Service in the planning process.

management intensity: A management practice or combination of management practices and associated costs designed to obtain different levels of goods and services.

management practice: A specific activity, measure, course of action, or treatment.

mean annual increment: Mean annual increment of growth is the total increment of increase of volume of a stand (standing crop plus thinnings) up to a given age divided by that age. In land management plans, mean annual increment is expressed in cubic measure and is based on the expected growth of stands, according to intensities and utilization guidelines in the plan.

mechanical equipment: Any contrivance which travels over ground, snow, or water on wheels, tracks, skids, or by flotation that is powered by a living source. This term does not include nonmotorized river craft, wheelchairs, or other similar devices used solely to assist persons with disabilities.

mechanical fuel treatment: A fuel treatment using mechanical means, such as thinning by chainsaw or machines, mastication, crushing down wood, or piling down wood with machines.

mechanized: Wheeled forms of transportation (including nonmotorized carts, wheelbarrows, bicycles and any other nonmotorized, wheeled vehicle).

mesic: Pertaining to conditions of moderate moisture or water supply; used of organisms occupying moist habitats.

metapopulations: Multiple populations of the same species coexisting in time but not space.

microclimate: The climatic conditions within a small habitat such as: a tree stump, under a boulder, in the space between grasses, or on the side of a slope.

migration corridor: The habitat pathway an animal uses to move from one place to another.

minerals-locatable: Those hardrock minerals that are mined and processed for the recovery of metals. They also may include certain nonmetallic minerals and uncommon varieties of mineral materials, such as valuable and distinctive deposits of limestone or silica.

minerals-leasable: Coal, oil, gas, phosphate, sodium, potassium, oil shale, sulphur, and geothermal resources.

minerals-materials (salable): A collective term to describe common varieties of sand, gravel, stone, pumice, pumicite, cinders, clay, and other similar materials. Common varieties do not include deposits of those materials that may be locatable.

minimum impact suppression tactics (MIST): A set of guidelines prescribing safety, fire line procedures, tools, and equipment that has the least impact on the environment during suppression and mop-up phases of fire (NWCG 2014).

mining: Any activity related to the discovery, extraction, and exploration of minerals under the Mining Act of 1872 and the Mineral Leasing Act of 1920 through the use of, among other things, hydraulic equipment, pans, ground sluicing, sluice boxes, rockers, or suction dredges.

mining claim: A particular parcel of public land, valuable for a specific mineral deposit or deposits, for which an individual has asserted a right of possession. The right is for developing and extracting a discovered mineral deposit.

mining lands: Lands primarily used for mining purposes as of June 13, 1994 and which are assigned to the mining land category in 36 CFR 292.22 of the private land use regulations.

mitigation: Measures designed and implemented to counteract environmental impacts or to make impacts less severe.

mixed-severity fire: These fire regimes will have the greatest toll on thinner barked and/or young age classes within the stand. Low intensity fires within the stand will favor overstory fire-resistant species (ponderosa pine, western larch, and Douglas fir). Crown fire potential does exist depending on stand structures and age classes of different stand cohorts of any available ladder fuels. If it occurs, the result will favor the return to grass and forbs.

moist upland forest: forests generally occurring at moderate elevations in the montane vegetation zone, or at the lower end of the subalpine zone. They are adjoined by cold forests at their upper edge and by dry forests at their lower edge. They are characterized by slightly longer growing seasons compared to the cold upland forest, and generally have cooler temperatures and higher precipitation than the lower elevation dry upland forests. Late successional stands are generally dominated by subalpine fir, grand fir or Douglas-fir. Lodgepole pine or western larch often occur as dominant species in early successional moist upland forests. Douglas-fir and western white pine are common mid-seral species.

monitoring: A systematic process of collecting information to evaluate effects of actions or changes in conditions or relationships.

montane: A terrestrial community that generally is found in moderate (ponderosa pine) and subalpine terrestrial communities. Montane communities are generally moister than lower montane and warmer than subalpine communities, and support a unique clustering of wildlife species.

mosaic: A pattern of vegetation in which two or more kinds of communities are interspersed in patches, such as clumps of shrubs with grassland between.

motorized equipment: Any machine powered by a nonliving source. This term does not include motorized river craft or small hand-held devices such as flashlights, shavers, wristwatches, and Geiger counters.

multi-story: Structural arrangement of trees within a stand generally characterized by having more than one distinct horizontal layer of tree crowns. Each layer may also be referred to as a stratum.

multiple-use management: The management of all the various renewable surface resources of the National Forest System so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some lands will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output ([1982] 36 CFR § 219.3).

municipal watersheds (public supply watersheds): A watershed that serves a public water system as defined in Public Law 93-523 (Safe Drinking Water Act) or as defined in state safe drinking water regulations. The definition does not include communities served by a well or confined groundwater unaffected by Forest Service activities.

mycorrhiza: a fungus that often grows in association with the roots of a plant in a symbiotic relationship. The symbiotic relationship between the fungus and the roots of certain plants, especially trees enhances their ability to take nutrients from soil.

N

National Ambient Air Quality Standards (NAAQSs): Standards set by the Federal Environmental Protection Agency for the maximum levels of air pollutants that can exist in the outdoor air without unacceptable effects on human health or the public welfare.

National Environmental Policy Act (NEPA): An act to declare a national policy which will encourage productive and enjoyable harmony between humankind and the environment, to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of humanity, to enrich the understanding of the ecological systems and natural resources important to the nation, and to establish a Council on Environmental Quality.

National Forest Management Act (NFMA): A law passed in 1976 as an amendment to the Forest and Rangeland Renewable Resources Planning Act, requiring the preparation of forest plans and the preparation of regulations to guide that development.

National Forest System (NFS): All national forest lands reserved or withdrawn from the public domain of the United States; all national forest lands acquired through purchase, exchange, donation, or other means; the National Grasslands and land utilization projects administered under Title III of the Bankhead-Jones Farm Tenant Act (50 Stat. 525, 7 U.S.C. 1010-1012); and other lands, waters, or interests therein which are administered by the Forest Service or are designated for administration through the Forest Service as a part of the system.

National Forest System road: A classified forest road under the jurisdiction of the Forest Service. The term National Forest System roads is synonymous with the term forest development roads as used in 23 USC 205. Generally referred to as a Forest Road.

National Recreation Trail: Trails designated by the Secretary of the Interior or the Secretary of Agriculture as part of the national system of trails authorized by the National Trails System Act. National recreation trails provide a variety of outdoor recreation uses.

National Register of Historic Places: A listing (maintained by the U.S. National Park Service) of areas that have been designated as being of historical significance. The Register includes places of local and state significance as well as those of value to the Nation.

National Wild and Scenic River System: Includes rivers with outstanding scenic, recreational, geological, fish and wildlife, historic, cultural or other similar values designated by Congress under the Wild and Scenic Rivers Act for preservation of their free-flowing condition. Refer to Wild and Scenic River.

native species: Species that normally live and thrive in a particular ecosystem. Animals or plants that have historically occupied a given aquatic or terrestrial area.

natural disturbance: (see disturbance).

near natural rates of recovery: Rates not exceeding condition thresholds and meeting standards for forage and browse utilization.

neotropical: Those species of birds that nest in the United States or Canada and winter regularly in the Neotropics (south of the Tropic of Cancer and Capricorn) in Mexico, the Caribbean Islands, or Central or South America. 2).

net public benefits: An expression used to signify the overall long- term value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not. Net public benefits are measured by both quantitative and qualitative criteria rather than a single measure or index. The maximization of net public benefits to be derived from management of units of the National Forest System is consistent with the principles of multiple use and sustained yield.

niche: A place or activity for which a thing is best fitted.

no-action alternative: The most likely condition expected to exist in the future if current management direction were to continue unchanged.

nonfunctional: Riparian-wetland areas that clearly are not providing adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows and not reducing erosion or improving water quality. The absence of certain physical attributes, such as a floodplain where one should be, is an indicator of nonfunctioning conditions (Process for Assessing Proper Functioning Condition, USDI BLM 1993).

nongame species: Those species of animals that are not managed as a sport hunting resource.

nonlethal fire: Fires that consist of low intensity under burns with limited single tree or group torching. Fire related mortality to the dominant-fire resistant species is slow, but occurs because of this type of localized fire behavior. In forests, fires in which more than 70 percent of the basal area or more than 90 percent of the canopy cover survives; in rangelands, fires in which more than 90 percent of the vegetative cover survives (implies that fire is occurring in an herbaceous-dominated community).

nonnative invasive species (NNIS): Plant species that are introduced into an area in which they did not evolve and in which they usually have few or no natural enemies to limit their reproduction and spread. These species can cause environmental harm by significantly changing ecosystem composition, structure, or processes and can cause economic harm or harm to human health.

nonpoint source pollution: Pollution whose source is general rather than specific in location; the sources of the pollutant discharge are dispersed, not well defined or constant. Examples include sediments from logging activities and runoff from agricultural chemicals. It is widely used in reference to agricultural and related pollutants, such as production of sediments by logging operations, agricultural pesticide applications, or automobile exhaust pollution.

nontreaty bands: The five bands of Nez Perce whose traditional homes lay outside the reduced reservation boundaries described in the Treaty of 1863.

noxious weeds: Plants designated as noxious weeds by the Secretary of Agriculture or by the responsible state official. Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier or host of serious insects or disease, and being native or new to or not common to the united states or parts thereof. A noxious weed is one that causes disease or has other adverse effects on the human environment and therefore is detrimental to the agriculture and commerce of the United States and to the public health.

nutrient cycling: Ecological processes in which nutrients and elements such as carbon, phosphorous, nitrogen, calcium, and others, circulate among animals, plants, soils, and air.

O

objective: A concise, time-specific statement that describes the incremental progress expected to take place to meet goals (desired conditions) over the planning period with respect to estimated quantities of services and accomplishments. Objectives are projections of outcomes based on certain social, economic, and ecological indicators that measure the plans performance and identify specific opportunities and possible future proposals in terms of ongoing programs and future projects to support the goals for the Planning Area.

off-channel: Aquatic habitats separated from the main stream or river, such as side-channels, oxbows, ponds, or sloughs, which may or may not be directly connected to a river or stream.

off-highway vehicle (OHV): Any motor vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other natural terrain.

old forest stage: Old forests are ecosystems distinguished by a relative abundance of old trees and related structural attributes. Old forest encompasses the later stages of stand development that typically differ from earlier stages in a variety of characteristics which may include tree size, accumulation of large dead woody material, number of canopy layers, species composition, and ecosystem function. The age at which stands reach the old forest stage and the specific structural attributes that characterize the old forest stage varies by forest type, site conditions, and disturbance regime. Measurable criteria for these attributes have been established for the major forest cover types by the Pacific Northwest Region of the Forest Service (USDA Forest Service 1993). These structure based definitions incorporate minimum numbers of trees per acre of minimum qualifying ages ranging from 150 to 200 years as well as minimum sizes of 21 to 31 inches for several forest types common to this area. Depending largely on the natural disturbance

regime, old forest may occur in a single-story stage, called "old forest single-story (OFSS)," or as a multi-storied stage, called "old forest multi-storied (OFMS)."

- **old forest multi-story (OFMS):** This stage of old forest includes multiple age classes and canopy layers, along with large, old trees. Decaying fallen trees may also be present that leave a discontinuous overstory canopy. Overstory diameters are generally greater than 20 inches.
- **old forest single-story (OFSS):** This stage of old forest typically results from low-intensity surface fire. This structure class can include multiple age classes, but generally only includes one main overstory strata. Large, old trees are common. Decaying fallen trees may also be present that leave a discontinuous overstory canopy. Overstory diameters are generally greater than 20 inches.

ongoing actions: Those actions that have been implemented, or have contracts awarded or permits issued. Refer to new actions.

openings: Natural or artificially created areas characterized by a lack of significant tree or shrub cover. Examples include meadows, clearcuts, and other areas of vegetation that do not provide hiding or thermal cover. When openings are created in the forest by the application of even-aged silviculture, as a minimum, openings in forest stands are no longer considered openings once a new forest is established.

operational plan: A document approved by the forest supervisor which specifies at the project level, implementation of the management direction established in the forest plan.

outcome: The long-term results of a program activity compared to its intended purpose (Government Performance and Results Act of 1993 (5 U.S.C. 306)). Outcome is a state of being similar to long-term ecological, social, or economic condition or goal (such as the maintenance of an ecosystem's biodiversity, jobs and income, or the quality of a regions' surface water as measured by indicators).

outdoor recreation activities: Activities such as camping, picnicking, rafting, boating, hiking, rock climbing, fishing, hunting, horseback riding, and the viewing of wildlife or scenery.

outfitting: Providing through rental or livery any saddle or pack animal, vehicle or boat, tents or camping gear, or similar supplies or equipment, for pecuniary remuneration or other gain. The term guide includes the holder's employees, agents, and instructors. Pecuniary remuneration means monetary reward (Washington Office Amendment 2709.11-95-11, 41-53C).

outputs: A broad term for describing any result, product, service or concern that a system produces by its activities. They are measurable and capable of being used to determine the effectiveness of programs and activities in meeting objectives. The unit of measure should indicate or serve as a proxy for what the recipients get rather than what the agency does in the process of producing the given output. Example: timber sold, recreation use, livestock grazing use, etc. Any good, service, or on-site use that is produced from rural resources.

outslope: Roads that are sloped towards the downhill side of the roadway to better match the natural drainage patterns and minimize the potential for diversion.

outstandingly remarkable values: Term used in the Wild and Scenic Rivers Act of 1968; to qualify as outstandingly remarkable, a resource value must be a unique, rare, or exemplary feature that is significant at a regional or national level.

overgrazing: Consumption of rangeland grass by grazing animals to the point that it cannot be renewed, or can be only slowly renewed, because of damage to the root system.

over-snow vehicle: A self-propelled vehicle intended for travel primarily on snow driven by a track or tracks in contact with the snow, and steered by a ski, ski's or tracks in contact with the snow.

overstory: Trees whose crowns constitute the highest horizontal layer of vegetation in a forest stand.

overwinter: To keep livestock or plants alive through the winter by sheltering them, or to be kept alive in this way.

P

PACFISH: Regional Forester's Amendment 3, Interim strategies for managing anadromous fish–producing watersheds in Eastern Oregon and Washington, Idaho, and portions of California (USDA and USDI 1995).

paleontological sites: Areas that contain any remains, trace, or imprint of a plant or animal that has been preserved in the earth's crust before the Holocene epoch.

parcel: Contiguous tax lots under one ownership. For the purposes of the Private LURs, rights-of-way do not divide parcels into smaller units.

particulate emissions: Solid particles or liquid droplets that can be suspended or carried in the air, or released as air contaminants into the outdoor atmosphere.

PM_{10} – Particulate matter that measures 10 micrometers in diameter or less, a size considered small enough to invade the alveolar regions of the lung. PM_{10} is one of the six pollutants for which there are National Ambient Air Quality Standards.

$PM_{2.5}$ – Particulate matter that measures 2.5 micrometers in diameter or less.

passive restoration: The achievement of restoration through the use of natural processes, sequences, and timing which occurs after the removal or reduction of adverse stresses without other specific positive remedial action.

patch: An area of vegetation that is relatively homogeneous internally and differs from surrounding elements.

pathogen: An agent such as a fungus, virus, or bacterium that causes disease.

pattern: The spatial arrangement of landscape elements (patches, corridors, matrix) that determines the function of a landscape as an ecological system.

pesticide: A chemical preparation used to control individuals or populations of injurious organisms.

permittee (livestock): Any entity that has been issued a grazing permit.

phases: Plant communities or seral stages within a steady state connected to each other by community pathways.

plan component: Parts of a national forest land and resource management plan that cannot be changed without a plan amendment analysis as required by the National Environmental Policy Act and the Planning Rule. Plan components include goals, desired conditions, standards, guidelines, objectives, special areas, management areas, and suitable uses and activities.

Planning Area: The area of the National Forest System covered by a regional guide or forest plan.

planning horizon: The overall time period considered in the planning process that spans all activities covered in the analysis or plan and all future conditions and effects of proposed actions which would influence the planning decisions.

plant associations: A plant community type based on the land management potential, successional patterns and species composition.

plant communities: Any grouping of plants that have some structural similarity (Johnson and Simon 1987).

plateau: Any comparatively flat area of great extent and elevation; specifically an extensive land region considerably more elevated above the adjacent country; it is commonly limited on at least one side by an abrupt descent.

point source pollution: Pollution that comes from a single identifiable source such as a smokestack, a sewer, or a pipe.

pool: Portion of a stream where the current is slow, often with deeper water than surrounding areas and with a smooth surface texture. Often occur above and below riffles and generally are formed around stream bends or obstructions such as logs, root, wads, or boulders. Pools provide important feeding and resting areas for fish.

potential natural community: The biotic community that would become established if all successional sequences were completed without interference by humans under present environmental conditions. Natural disturbances are inherent in development.

potential vegetation group (PVG): A group of potential vegetation types grouped on the basis of similar general moisture or temperature environment and similar types of life forms.

potential vegetation types (PVT): A kind of physical and biological environment that produces a kind of vegetation; the species that might grow on a specific site I the absence of disturbance; can also refer to vegetation that would grow on a site in the presence of frequent disturbance that is an integral part of the ecosystem and its evolution.

precommercial thinning: Thinning generally within stands or size classes considered too small to be harvested commercially, where the removal of trees is not for immediate financial return but to improve the stand by reducing stocking and concentrating growth on the more desirable trees.

prehistoric site: An area that contains important evidence and remains of the life and activities of early societies that did not record their history.

prescribed fire: Any fire ignited by management actions to meet specific objectives. Prescribed fire is intended to mimic natural fire regimes to: 1) reduce the risk of fires burning outside of historic intensities and severities that could substantially reduce long–term productivity; 2) maintain tree species compositions that occur under the natural disturbance regime; 3) reduce competition; 4) increase nutrients; 5) prepare sites for natural regeneration; 6) improve forage resources; (7) enhance/create wildlife habitat; and (8) protect private and public property values. A written, approved prescribed fire plan must exist, and National Environmental Policy Act (NEPA) requirements (where applicable) must be met, prior to ignition.

prescription: A management pathway to achieve a desired objective(s).

present net value (PNV): The difference between the discounted value (benefits) of all outputs to which monetary values or established market prices are assigned and the total discounted costs of managing the Planning Area.

primitive recreation: Those types of recreation activities associated with unroaded land, for example: hiking, backpacking, and cross–country travel.

private land: Land not in federal, state, or local government ownership.

productive capacity: The growth and accumulation of plant biomass (primary productivity) as well as the growth of animal species that use the products (secondary productivity). Key elements of productivity include the physical, chemical, and biological properties of soils which provide for vegetative growth and the accumulation and cycling of nutrients.

productivity: Productivity is based on using natural resources no faster than they are produced or can be replaced and using natural resources without impairment of the long-term productive capacity of the ecosystem from which they are derived.

programmatic agreement (PA): This is a historic preservation document that records the terms and conditions agreed upon to resolve the potential adverse effects of a Federal agency program, complex undertaking or other situations in accordance with the Section 106 review under National Historic Preservation Act (NHPA) [36CFR800.14(b)].

proper functioning condition (PFC): Riparian and wetland areas achieve proper functioning condition when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high water flows. This thereby reduces erosion and improves water quality; filters sediment, captures bedload, and aids floodplain development; improve flood–water retention and ground water recharge; develops root masses that stabilize stream banks against cutting action; develops diverse ponding and channel characteristics to provide the habitat and water depths, duration, and temperature necessary for aquatic vertebrate and invertebrate production, waterfowl breeding, and other issues; and supports greater biodiversity. The functioning condition of riparian and wetland areas is a result of the interaction among geology, soil, water and vegetation.

project: An organized effort to achieve an objective identified by location, timing, activities, outputs, effects, and time period and responsibilities for executions.

project-level: Site-specific analysis and planning processes for a specific project or set of projects usually on an individual ranger district.

proposed action: A proposal by a federal agency to authorize, recommend, or implement a management action.

preliminary administratively recommended wilderness area (PARWA): An area that has been determined to meet the criteria to be designated as wilderness and is proposed in this land management plan by the forest supervisor(s) to be recommended to Congress for inclusion into the National Wilderness Preservation System.

public issue: A subject or question of widespread public interest relating to management of the National Forest System.

Q

qualitative: Traits or characteristics that relate to quality and cannot be measured with numbers.

quality of life: Refers to the satisfaction people feel for the places where they live (or may visit) and for the places they occupy as part of that experience.

quantitative: Traits or characteristics that can be measured with numbers.

R

range forage condition: The current composition or productivity of rangeland relative to what that rangeland is capable of producing as a potential natural community, and often synonymous with forage condition.

range analysis: The systematic interpretation, analysis, and evaluation of data for rangeland resource management planning. It provides ecological and other information for overall forestland and resource management planning and allotment management planning.

rangeland (range): Lands where the vegetation is predominately grasses, grass-like plants, forbs, or shrubs. Rangelands include natural grasslands, shrublands, savannahs, tundra, most deserts, and riparian and wetland plant communities, including marshes and wet meadows, with greater than about 200 pounds of forage production per year per acre.

rangeland resources: The physical and biotic resources of rangeland ecosystems.

rangeland resource inventory: The systematic acquisition of inventory data that characterizes the vegetation, soil, and other rangeland resources.

rangeland vegetation: Vegetation on all land with rangeland resource objectives or rangeland resource values, including riparian areas. Generally, the focus is on land supporting grass or grass-like plants, forbs, or shrubs during one or more ecological stages. Forested and nonforested sites providing forage and habitat for wild and domestic animal species are included.

rare combinations of aquatic, terrestrial and atmospheric habitats: Principally reflect physical environmental features of the landscape that are produced from a unique combination of soils, climate, precipitation, and aspect. Refer to the analysis files for a complete description.

rare plants (as applicable to the Hells Canyon National Recreation Area): Plants that are federally listed as threatened, endangered, or proposed for federal listing; Forest Service Sensitive for Regions 1, 4, and 6, or disjunct species. This includes plants considered rare both globally (G1, G2, G3) or within states (S1, S2 or S3).

real dollar value: A monetary value which compensates for the effects of inflation.

rearing habitat: Area in rivers or streams where juvenile salmon and trout find food and shelter to live and grow.

reasonable assurance: A judgment made by the Responsible Official based on best available scientific information and local professional experience that practices based on existing technology and knowledge are likely to deliver the intended results. Reasonable assurance applies to average and foreseeable conditions for the area and does not constitute a guarantee to achieve the intended results.

receipt shares: The portion of receipts derived from Forest Service resource management that is distributed to State and county governments, such as the Forest Service 25 percent fund payments.

recontour: To move soil back (usually with mechanical or hand tools) to a previous condition thus making an area blend with the natural landscape.

record of decision (ROD): An official document separate from, but associated, with a final environmental impact statement in which a deciding official identifies all alternatives, and specifies which were environmentally preferable, states the decision, and states whether all practicable means to avoid environmental harm from the alternative have been adopted, and if not, why not (40 CFR 1505.2).

recovery plans: A plan for the survival and conservation of species listed under the Endangered Species Act. The Act [Section 4(f)] requires that recovery plans contain: 1) objectives, measurable goals for delisting; 2) a comprehensive list of the actions necessary to achieve the delisting goals; and 3) an estimate of the cost and time required to carry out those actions. In addition, NOAA Recovery Planning Guidelines suggest that recovery plans include an assessment of the factors that led to population declines and/or which are impeding recovery. Finally, it is important that the plans include a comprehensive monitoring and evaluation program for gauging the effectiveness of recovery measures and overall progress toward recovery.

recreation: Leisure time activity such as swimming, picnicking, boating, hunting, and fishing.

> **developed recreation:** Recreation that requires facilities that, in turn, result in concentrated use of an area. Examples of developed recreation areas are campgrounds and ski areas; facilities in these areas might include roads, parking lots, picnic tables, toilets, drinking water, ski lifts, and buildings.
>
> **dispersed recreation:** A general term referring to recreation use outside developed recreation sites; this includes activities such as scenic driving, hiking, backpacking, hunting, fishing, snowmobiling, horseback riding, cross–country skiing, and recreation in primitive environments.

recreation opportunity: The availability of choices for users to participate in the recreational activities they prefer within the settings they prefer.

recreation opportunity spectrum: A recreation opportunity setting is the combination of physical, biological, social, and managerial conditions that give value to a place. Thus, an opportunity includes qualities provided by-nature (vegetation; landscape, topography, scenery), qualities associated with recreational use (levels and types of use), and conditions provided by management (developments, roads, regulations). By combining variations of these qualities and conditions, management can provide a variety of opportunities for recreationists. The settings, activities, and opportunities for obtaining experiences have been arranged along a continuum or spectrum divided into six classes: primitive, semi-primitive nonmotorized, semi-primitive motorized, roaded natural, rural, and urban (40 CFR 1505.2).

> **primitive** – Area is characterized by an essentially unmodified natural environment of fairly large size Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use within the area is not permitted.
>
> **semi-primitive nonmotorized** – Area is characterized by a predominantly natural or natural appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but would be subtle. Motorized recreation use is not permitted, but local roads used for other resource management activities may be present on a limited basis. Use of such roads is restricted to minimize impacts on recreational experience opportunities.
>
> **semi-primitive motorized** – Area is characterized by a predominantly natural or natural appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions use of local primitive or collector roads with predominantly natural surfaces and trails suitable for motor bikes is permitted.

roaded natural – Area is characterized by predominantly natural-appearing environments with moderate evidence of the sights and sounds of man. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high, with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is allowed and incorporated into construction standards and design of facilities

rural – Area is characterized by substantially modified natural environment. Resource modification and utilization practices are to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities is designed for use by a large number of people Facilities are often provided for special activities. Moderate densities are provided far away from developed sites Facilities for intensified motorized use and parking are available.

urban – Area is characterized by a substantially urbanized environment, although the background may have natural appearing elements. Renewable resource modification and utilization practices are to enhance specific recreation activities. Vegetative cover is often exotic and manicured. Sights and sounds of humans, on-site, are predominant. Large numbers of users can be expected, both on site and in nearby areas. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site.

recreation residences: Privately owned recreation cabins authorized by special use permit on National Forest System land that occupy planned, approved tracts or those groups of tracts established for recreation residence use.

recreation site: Specific places in the national forest other than roads and trails that are used for recreational activities. These sites include a wide range of recreational activities and associated development. These sites include highly developed facilities like ski areas, resorts, and campgrounds. It also includes dispersed recreation sites that have few or no improvements but show the effects of repeated recreation use.

recreation visit: An entry of one person to a recreation site or area of land or water for the purpose of participating in one or more recreation activities for an unspecified period.

recreational facilities: Refers to facilities associated with or required for outdoor recreational activities and includes, but are not limited to, parks, campgrounds, hunting and fishing lodges, and interpretive displays.

recreational river: Refer to Wild And Scenic River.

redd: Nest in gravel of stream bottom where a fish deposits eggs.

reforestation: A reference to a specific reforestation activity used to establish reproduction in a stand. Treatments include tree planting, direct seeding, coppice or root suckers, site preparation for natural reproduction (regeneration), or natural regeneration without site preparation.

refugia: Areas that have not been exposed to great environmental changes and disturbances undergone by the region as a whole; refugia provide conditions suitable for survival of species that may be declining elsewhere.

regeneration: The process of establishing new plant seedlings, whether by natural means or artificial measures (e.g., planting, seeding).

regeneration harvest method: A timber harvest procedure by which a new age class is created. The major methods are clearcutting, seed-tree, shelterwood, single tree selection, group selection and coppice. Regeneration methods are grouped into four categories: coppice, even-aged, two-aged, and uneven-aged.

regulations: Generally refers to the Code of Federal Regulations, Title 36, chapter II, which covers management of the Forest Service.

rehabilitate: To repair and protect certain aspects of a system so that essential structures and functions are recovered, even though the overall system may not be exactly as it was before.

relative stand density (see also stand density): The absolute stand density compared relative to the biological maximum carrying capacity for a given site and given species or group of species.

relic: Persistent remnants of formerly widespread fauna or flora species existing in certain isolated areas or habitats. The existence of an organism or species in an otherwise extinct taxon (phylum, order, family, genus, or species) from an earlier time that has survived in an environment that has undergone considerable change.

renewable energy: Energy derived from natural sources, such as sunlight, wind, water, tides, or geothermal resources, that does not consume the resource when used.

research natural area (RNA): An area set aside by a public or private agency specifically to preserve a representative sample of an ecological community, primarily for scientific and educational purposes. In Forest Service usage, Research Natural Areas are areas designated to ensure representative samples of as many of the major naturally–occurring plant communities as possible.

resident fish: Fish that spend their entire life in freshwater; examples include bull trout and westslope cutthroat trout.

resilience: The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organization, and the capacity to adapt to stress and change.

resource: Anything which is beneficial or useful, be it animal, vegetable, mineral, a location, a labor force, a view, an experience, etc. Resources, in the context of land use planning, thus vary from such commodities as timber and minerals to such amenities as scenery, scenic viewpoints, or recreation opportunities.

Resource Advisory Council (RAC): RACs were established by the BLM, under the Federal Advisory Committee Act to provide a forum for nonfederal partners to engage in discussion with agency managers regarding management of federal lands.

responsible official: The Forest Service employee who has the authority to select and/or carry out a specific planning action.

restoration: The process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed. Ecological restoration focuses on reestablishing the composition, structure, pattern, and ecological processes necessary to facilitate terrestrial and aquatic ecosystems sustainability, resilience, and health under current and future conditions.

resource allocation: The action of apportioning the supply of a resource to specific uses or to particular persons or organizations.

riparian area: An area with distinctive soils and vegetation between a stream, or other body of water, and the adjacent upland area consisting of vegetation that requires free, or unbound, water for survival.

riparian-dependent species: Plant species that rely on free or unbound water for establishment and survival, and animal species that would normally occupy, or rely on, riparian habitats.

riparian management areas (RMAs): Portions of watershed where riparian–dependent resources receive primary emphasis and management activities are subject to specific standards and guidelines. Riparian management areas include traditional riparian corridors, wetlands, intermittent headwater streams, and other areas where proper ecological functioning is crucial to maintenance of the streams' water, sediment, woody debris, and nutrient delivery system.

fish-bearing streams: Riparian management areas consist of the stream and the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance (600 feet total, including both sides of the stream channel), whichever is greatest. In degraded or incised streams, the riparian management area should extend from the edge of the active channel to the outer extent of the former floodplain. It is expected that riparian management area widths along fish-bearing streams will not be less than described here.

permanently flowing non-fish-bearing streams: Riparian management areas consist of the stream and the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance (300 feet total, including both sides of the stream channel), whichever is greatest. In degraded or incised streams, the riparian management area should extend from the water's edge to the outer extent of the former floodplain.

constructed ponds and reservoirs, and wetlands greater than 1 acre: Riparian management areas consist of the body of water or wetland and: the area to the outer edges of the riparian vegetation, or to the extent of seasonally saturated soil, or the extent of unstable and potentially unstable areas, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance from the edge of the wetland greater than 1 acre or the maximum pool elevation of constructed ponds and reservoirs, whichever is greatest.

lakes and natural ponds: Riparian management areas consist of the body of water and the area to the outer edges of the riparian vegetation, or to the extent of seasonally saturated soil, or to the extent of unstable and potentially unstable areas, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance, whichever is greatest.

seasonally flowing or intermittent streams, wetlands, seeps and springs less than 1 acre, and unstable and potentially unstable areas: This category applies to features with high variability in size and site-specific characteristics. At a minimum, the riparian management areas should include:

- The extent of unstable and potentially unstable areas (including earthflows).
- The stream channel and extend to the top of the inner gorge, or in incised streams, to the edge of the former floodplain.
- The stream channel or wetland and the area from the edges of the stream channel or wetland to the outer edges of the riparian vegetation, extending from the edges of the stream channel to a distance equal to the height of one site-potential tree, or 100 feet

slope distance, whichever is greatest. A site-potential tree height is the average maximum height of the tallest dominant trees for a given site class.

- Intermittent streams are defined as any nonpermanent flowing drainage feature having a definable channel and evidence of annual scour or deposition. This includes what are sometimes referred to as ephemeral streams if they meet these two physical criteria. Including intermittent streams, springs, and wetlands within riparian management areas is important for full implementation of the Blue Mountains ARCS. Accurate identification of these features is critical to the correct implementation of the strategy and protection of the intermittent stream and wetland functions and processes. Identification of these features is difficult at times due to the lack of surface water or wet soils during dry periods. Fish-bearing intermittent streams are distinguished from non-fish-bearing intermittent streams by the presence of any species of fish for any duration. Many intermittent streams may be used as spawning and rearing streams, refuge areas during flood events in larger rivers and streams or travel routes for fish emigrating from lakes. In these instances, the guidelines for fish-bearing streams would apply to those sections of the intermittent stream used by the fish.

riverine: On or near the banks of a river; riparian.

road: A motor vehicle route over 50 inches wide, unless designated and managed as a trail. A road may be classified, unclassified, or temporary (36 CFR 212.1).

classified roads: Roads wholly or partially within or adjacent to national forest lands that are determined to be needed for long-term motor vehicle access, including state roads, county roads, privately owned roads, forest roads, and other roads authorized by the Forest Service (36 CFR 212.1).

closed road: A road with all use suspended year–long by an active form of facility management utilizing regulations and appropriate enforcement to secure and ensure user compliance with closure.

open road: A road that has no use restrictions or regulations imposed and is available for use by vehicles at any time during the year.

temporary roads: Roads authorized by contract, permit, lease, other written authorization, or emergency operation not intended to be a part of the national forest transportation system and not necessary for long-term resource management (36 CFR 212.1).

road construction: Activity that results in the addition of forest classified or temporary road miles (36 CFR 212.1). New construction activities may include vegetation clearing and grubbing, earthwork, drainage installation, instream activities, pit development or expansion, surfacing (including paving), and aggregate placement.

road decommissioning: Activities that result in the stabilization and restoration of unneeded roads to a more natural state (36 CFR 212.1, FSM 7703). Road decommissioning activities include revegetation, recontouring, water barring, roadbed scarification or ripping, culvert removal, berm construction, and side cast pullback.

road density: An indicator of the concentration of roads in an area.

road maintenance: The ongoing upkeep of a road necessary to retain or restore the road to the approved road management objective.

road maintenance levels (MLs): Maintenance levels define the level of service provided by, and maintenance required for, a specific road. Maintenance levels must be consistent with road management objectives and maintenance criteria. Roads assigned to maintenance levels 2 through 5 are either constant service roads or intermittent service roads during the time they are open to traffic.

Level 1: Assigned to intermittent service roads during the times they are closed to vehicular traffic. The closure period must exceed 1 year. Basic custodial maintenance is performed to keep damage to adjacent resources to acceptable levels and to perpetuate the road to facilitate future management activities. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Appropriate traffic management strategies are prohibit and eliminate.

Roads receiving Maintenance Level 1 maintenance may be of any type, class, or construction standard, and may be managed at any other maintenance level during the time they are open for traffic. However, while being maintained at Maintenance Level 1, they are closed to vehicular traffic, subject to prohibitions and restrictions, and may be available and suitable for nonmotorized users.

Maintenance Level 1 maintenance activities include road condition surveys, evaluation, and monitoring of maintenance needs. Activities include limited equipment operation, opening closed roads, manual cleaning of drainage structures, and vegetation management that stabilizes or reduces erosion. Repairs are scheduled and completed within funding limitations when critical resource damage is reported.

Roadway activities including blading, clearing logs, and noncritical repairs that can be delayed are accomplished when the road is placed in an active status.

Level 2: Assigned to roads open for use by high-clearance vehicles. Providing access for passenger cars is not a consideration. Traffic is normally minor, usually consisting of administrative, permitted, dispersed recreation, and/or other specialized uses. Log hauling may occur. Appropriate traffic management strategies are either to discourage or prohibit passenger cars or to accept or discourage high-clearance vehicles.

Maintenance Level 2 maintenance activities include roadside brushing, hazard-tree removal, surface blading, drainage maintenance, structure maintenance, clearing logs, slide and slip cleanup and repair, sign maintenance and surface replacement. Drainage function and soil stabilization are of prime importance. Many roads in this category have grass in the travel way. User comfort is not a consideration.

Level 3: Assigned to roads open and maintained for travel by prudent drivers in standard passenger cars. User comfort and convenience are not considered priorities.

Roads in this maintenance level are typically low-speed, single-lane, with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material. Appropriate traffic management strategies are encourage or accept. Discourage or prohibit strategies may be employed for certain classes of vehicles or users.

Maintenance Level 3 maintenance activities include roadside brushing, hazard-tree removal, surface blading, drainage maintenance, structure maintenance, clearing logs, slide and slip cleanup and repair, sign maintenance and surface replacement. Drainage function and soil stabilization are of prime importance. Dust abatement and more frequent blading may be needed on segments of multi-purpose roads.

Level 4: Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double-lane and aggregate-surfaced. However, some roads may be single-lane. Some roads may be paved and/or dust abated. The most appropriate traffic-management strategy is encourage. However, the prohibit strategy may apply to specific classes of vehicles or users at certain times.

Maintenance Level 4 maintenance activities include roadside brushing, hazard tree removal, surface blading, drainage maintenance, structure maintenance, clearing logs, slide and slip cleanup and repair, sign maintenance and surface replacement. Drainage function and soil stabilization are of prime importance. Dust abatement and more frequent blading may be needed on segments of multi-purpose roads.

Level 5: Assigned to roads that provide a high degree of user comfort and convenience. These roads are normally double lane, paved. Some may be aggregate-surfaced and dust-abated. The appropriate traffic management strategy is encourage.

Maintenance Level 5 maintenance activities include roadside brushing, hazard-tree removal, surface blading, drainage maintenance, structure maintenance, logging out, slide and slip cleanup and repair, sign maintenance and surfacing replacement. Drainage function and soil stabilization are of prime importance. Dust abatement and more frequent blading may be needed on segments of multi-purpose roads. All of the Maintenance Level 5 roads within a national forest have a permanent (paved) surface.

road management objectives: Road management objectives define the level of service provided by a National Forest System road consistent with the surrounding recreation opportunity spectrum (ROS) class.

semi–primitive nonmotorized (SPNM): Most semi-primitive nonmotorized areas do not have developed roads. All motorized traffic is prohibited. Semi-primitive nonmotorized roads provide hiking or equestrian trails on closed or decommissioned roads.

semi–primitive motorized (SPM): Semi-primitive motorized roads are generally used for four-wheel drive, logging, or ranching activities. Passenger-car use is discouraged by entrance conditions or signage. Users can expect semi–primitive motorized roads where there are no attractions such as viewpoints or trailheads.

- **low-level SPM:** Native surface roads suitable for high-clearance vehicles but not passenger cars or vehicles towing trailers. Users may need to back vehicles for long distances when meeting oncoming traffic. Maintenance activities occur usually every five years or when resource needs are identified. Roads are allowed to “brush in” and users are responsible for removing trees blocking the road. Ruts and potholes are accepted if they do not contribute to sediment loading. Corresponds to road Maintenance Level 2 and Traffic Service Level D (abbreviated: 2-D).
- **high-level SPM:** Single-lane native surface road or road surfaced with spot rock, strip rock or pit run material suitable for high-clearance vehicles. The road may have infrequent turnouts. Pit run material is applied to the road surface, but is not grid rolled, leaving a rough, rocky surface that drains well and discourages passenger car use. User maintenance is the same as for the low-level semi–primitive motorized. This standard meets resource and safety needs and is the minimum standard for accessing attractions such as viewpoints or trailheads. Maintaining current road alignment, road surface type, and corridor width are emphasized. Corresponds to Maintenance Level 2 and Traffic Service Level C (abbreviated: 2-C).

roaded natural (RN): Roaded natural roads provide safe access for passenger cars. Maintenance activities generally occur annually or every two years, depending on funding and need. Forest Service clears these roads of brush and logs. Surface maintenance increases at higher levels. Because of increased speeds, turnouts are needed more frequently. Open local roads and some collector roads within roaded natural are managed for high-clearance vehicles. In such cases, road-maintenance standards defined for semi–primitive motorized would be used.

- **low-level RN:** Road-surface type of either native or base course. Pit-run material is processed to provide a rough but suitable service for passenger cars. Dust increases during dry conditions, and the road provides good resource protection when wet. Corresponds to road Maintenance Level 3 and Traffic Service Level C (abbreviated: 3-C).
- **medium-level RN:** Road-surface type of crushed aggregate, maintained for passenger cars. Usually maintained annually, surfaces may "washboard" and become dusty with increased use. Corresponds to road Maintenance Level 3 and Traffic Service Level C or B (abbreviated: 3-C or 3-B).
- **high-level RN:** Road-surface type of an aggregate that has been dust-abated or treated with soil or silicone stabilizers, or asphalt emulsions. A dust-free, smooth surface for passenger cars is the desired product. This standard is often applied to provide double-lane access to attractions such as viewpoints or campgrounds. Corresponds to road Maintenance Level 4 and Traffic Service Level B or A (abbreviated: 4-B or 4-A).

rural (R): Rural is generally the highest standard of road. These arterial roads provide the main access to the national forest lands but generally lack the speeds and alignment provided by state highways. Roads are double–lane with a road-surface treatment and generally 24-feet wide. The road has center striping and often stripes marking the shoulders. Corresponds to a road Maintenance Level 5 and Traffic Service Level A (abbreviated: 5-A).

road prism: an area consisting of the road surfaces and any cut slope and road fill.

road reconstruction: Activity that results in improvement or realignment of an existing classified road as defined below. Reconstruction activities may include vegetation clearing and grubbing, earthwork, drainage installation, instream activities, surfacing (including paving), and aggregate placement.

road improvement: Activity that results in an increase of an existing road's traffic service level, expands its capacity, or changes its original design function.

road surface types:

asphalt/concrete: A well-graded aggregate and asphalt cement.

aggregate: Stone, slag, gravel, or any other hard, inert, mineral material meeting certain specified quality requirements for use in a road pavement or surfacing structure.

paved: One or more bituminous bound layers of aggregate placed on a prepared road foundation.

pit run: Aggregate consisting of native materials from a given source with a maximum size and grading suitable for placing directly on a road without crushing or screening.

native surface: A road surface consisting of soil or aggregate materials naturally existing at the road location.

spot rock: Aggregate placed on a road as a pavement or surfacing structure in designated areas that are not continuous throughout the entire length of the road.

strip rock: Aggregate placed on a road as a surfacing structure in designated areas or portions of a road greater than 200 feet in length but not continuous throughout the entire length of the road.

surface treated: One or more applications of asphalt or other processed or natural materials to a road surface to provide traction, abate dust, protect, or renew the surface without increasing pavement structural capacity. Surface treatment is commensurate with existing surface.

rotation: In a timber production program, the number of years (including the regeneration period) required to establish and grow timber under an even-aged management system to a specified condition or maturity for regeneration harvest.

runoff (surface): Fresh water from precipitation and melting ice that flows on the earth's surface into nearby streams, lakes, wetlands, or reservoirs.

S

sale schedule: The quantity of timber planned for sale by time period from an area of suitable land covered by a forest plan. The first period, usually a decade, of the selected sale schedule provides the allowable sale quantity. Future periods are shown to establish that long-term sustained yield will be achieved and maintained.

salmonids: Fishes of the family Salmonidae, including salmon, trout, chars, whitefish, ciscoes, and grayling.

salvage harvest: Harvest of dead trees or trees being damaged or dying due to injurious agents other than competition, to recover value that would otherwise be lost. A salvage harvest is an intermediate harvest. If the salvage cutting is heavy enough to require regeneration, it would be correct to use terminology referring to a regeneration harvest method.

sanitation harvest: The removal of trees to improve stand health by stopping or reducing actual or anticipated spread of insects and diseases. A sanitation harvest is an intermediate harvest. If the sanitation cutting is heavy enough to require regeneration, it would be correct to use terminology referring to a regeneration harvest method.

satisfactory condition: A condition in which the soil is adequately protected and the forage species composition and production meets the land management plan objectives or the trend in forage species composition and production is acceptable.

savannah: The transitional biome between grassland and desert or desert and rainforest, typically having drought resistant vegetation dominated by grasses with scattered tall trees.

scabland: A region characterized by elevated tracts of rocky ground with little or no soil cover.

scale: (1) The level of resolution under consideration (for example, broad-scale or fine-scale); (2) the ratio of length on a map to true length.

scenery management system (SMS): The scenery management system is the method that was adopted after the Forest Plan was completed in 1990. The scenery management system utilizes

two indicators to determine desired landscape character: ecological landscape integrity and scenic integrity. Ecological landscape integrity evaluates whether the landscape is managed in a sustainable and ecologically sound manner. Scenic integrity evaluates whether the landscape character is being managed in a way that conserves constituent values in terms of the level of human-caused deviations that are acceptable to the public (USDA Forest Service 1995 SMS Handbook).

scenic area: Places of outstanding or matchless beauty that require special management to preserve these qualities. They may be established under 36 CFR 294.1 whenever lands possessing outstanding or unique natural beauty warrant this classification.

scenic class: Scenic class indicates the importance or value of a particular landscape determined by constituent information.

scenic identity: The scenic image and identity is the landscape character of an area. The landscape character identifies the "ideal" or optimal set of valued scenery attributes and describes the setting provided by these scenery attributes within each biophysical setting. It is important to understanding of the process, structure, and functions that support the valued set of scenery attributes. This understanding helps identify conditions and stressors that put scenery resources at risk.

scenic integrity level: Measures the degree to which a landscape is free from visible disturbances that detract from the natural or socially valued appearance. Scenic integrity objectives establish the desired level of scenic integrity for an area. Scenic stability measures the degree to which the valued landscape character and its scenery attributes can be sustained through time and ecological progression. Scenic stability objectives establish the desired level of scenic stability for a particular area. It is used to describe an existing situation, an objective for management, or desired conditions.

> **very high scenic integrity:** Scenery with fully intact landscape features and scenic compositions presenting the optimal landscape character in complete harmony, with very minute, if any, scenic discordance. Due to the optimal scenic integrity of the physical, biological, and cultural features in these scenic compositions, the landscape character and sense of place are expressed at the highest possible level. Very high scenic integrity is most compatible with wilderness, backcountry, biophysical, or cultural preserves, and other special classification areas.
>
> **high scenic integrity:** Scenery with whole or nearly intact landscape features and scenic compositions that present the optimal landscape character completely or nearly in full, and contain scenic discordances that are not evident.
>
> **moderately high scenic integrity:** Scenery with slightly altered landscape features and compositions in which the valued landscape character is the dominant scenic impression, yet minor discordance is apparent, but visually subordinate. The "moderate" level of scenic integrity in the Scenery Management Handbook has been split into two categories to reflect more accurately the scenic conditions on the in the Blue Mountains.
>
> **moderately low scenic integrity:** Scenery with altered landscape features and compositions that display a beginning dominance of valued landscape character expression and readily noticeable discordance.
>
> **low scenic integrity:** Scenery with obviously altered landscape features and compositions that dominate yet still express some aspects of valued landscape character. The scenic

harmony of the valued landscape character is seriously fragmented and barely restorable within reasonable periods and resource expenditures.

very low scenic integrity: Scenery with extremely altered landscape features and composition that no longer sustains significant aspects of valued landscape character. The scenic harmony of the optimal landscape character does not exist and its restoration may be impossible if not unrealistic.

scenic integrity objective: An established goal for the management of the scenic resource applied to a specific portion of the national forest.

scenic river: Refer to Wild and Scenic River.

science consistency review: Certification that the revised forest plan takes into account the best available science as required by the 2005 Planning Rule.

scoping process: A part of the NEPA process; the early stages of preparation of an environmental impact statement, early and open activities used to solicit public opinion, receive comments and suggestions, and determine the scope and significance of the issues to be considered in the development and analysis of a range of actions, alternatives, and impacts to be considered. Scoping may involve public meetings, telephone conversations, mailings, letters, or other contacts (40 CFR 1501.7).

screening: The reduction or elimination of the visual impact of any structure or land modification as seen from any public travel route within the national forests.

secondary productivity: The growth of animal species that use the products derived from The growth and accumulation of plant biomass (primary productivity).

sediment: Solid materials, both mineral and organic, in suspension or transported by water, gravity, ice, or air; may be moved and deposited away from their original position and eventually will settle to the bottom.

sediment regime: The rate, frequency, magnitude, and duration of sediment movement. Refer to flow regime.

seed tree regeneration method: An even-aged regeneration harvest method in which a new age class develops from seeds that germinate in fully-exposed micro-environments after removal of the previous stand, except for a small number of trees left to provide seed. Any retained trees, referred to as leave trees, should generally comprise less than 10% of the growing space of the stand. When the seed tree method is employed, the sequence of treatments can include three distinct types of cuttings:

1. seed tree preparatory cut - An optional cut that enhances conditions for seed production and/or develop wind firmness for a future seed cut.
2. seed cut - A cut to prepare the seed bed and create a new age class under full sun while retaining trees needed to provide seed needed for regeneration.
3. seed tree removal cut - An optional final removal cut that releases established regeneration from competition with seed trees after they are no longer needed for seed or as leave trees.

selection harvest methods: Silvicultural regeneration harvest methods used to create or maintain uneven-aged stands. Harvest methods that develop and maintain uneven-aged stands are single-tree selection and group selection.

self-reliance: Reliance on one's own capabilities, judgment, or resources through application of outdoor skills in an environment that offers a high degree of risk and challenge.

self-sustaining populations: Populations that are sufficiently abundant, interacting, and well-distributed in the Plan Area, within the bounds of their life history and distribution of the species and the capability of the landscape, to provide for their long-term persistence, resilience and adaptability over multiple generations.

sense of place: A reference for the physical, emotional, cultural, symbolic, and spiritual aspects of people's tangible and intangible relationships with the land and the meanings associated with them.

sensitive soils: Forest land areas that have a moderate to very high hazard for soil compaction. Erosion, displacement, mass wasting, or forest floor displacement.

sensitive species: Plant or animal species identified by a regional forester for which population viability is a concern either: 1) because of significant current or predicted downward trends in population numbers or density; or 2) because of significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution. Those species that have appeared in the Federal Register as proposed for classification or are under consideration for official listing as endangered or threatened species, that are on an official state list, or that are recognized by the regional forester as needing special management to prevent placement on federal or state lists.

seral: Refers to the stages that plant communities go through during the progression in structure and composition over time. Development stages have characteristic structure and plant species composition. See succession for definitions of different seral stages.

seral stage (see also succession): The developmental phase of a forest stand or rangeland with characteristic structure and plant species composition.

serotinous: characteristic of some lodgepole pine, in which the cones are covered with a resin that must be melted by heat for the cones to open and release seeds.

shade intolerant: Species of plants that are less tolerant of shaded conditions than other species, and often cannot survive in shaded conditions.

shade tolerant: Species of plants that can tolerate and survive in more shaded conditions than other species can.

shelterwood regeneration method: A method of regenerating an even-aged stand in which a new age class develops beneath the moderated micro-environment provided by the residual trees. Any retained trees, referred to as leave trees, should generally comprise less than 10% of the growing space of the stand. When the shelterwood regeneration method is employed, the sequence of treatments can include three distinct types of cuttings:

1. shelterwood preparatory cut - An optional cut that enhances conditions for seed production and/or develop wind firmness for a future shelterwood establishment cut.
2. shelterwood establishment cut - A cut to establish a moderated micro-environment, prepare the seed bed, and create a new age class.
3. shelterwood removal cut - A final removal cut that releases established regeneration from competition with shelter trees after they are no longer needed for shelter under the shelterwood regeneration method

shrubland: Area of land where the potential vegetation is dominated by shrubs.

short term: Generally refers to a period of 10 years or less.

silviculture: The art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis.

silvicultural system: A management process whereby forests are tended, harvested, and replaced, resulting in a forest of distinctive form. Systems are classified according to the method of carrying out the fellings that remove the mature crop and provide for regeneration and according to the type of forest thereby produced.

silvicultural treatment: A forest management activity such as thinning, harvesting, planting, pruning, prescribed burning, mastication, or site preparation that is designed to alter the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis.

single-story: Structural arrangement of trees within a stand generally characterized by having only one distinct horizontal layer of tree crowns. This layer may also be referred to as a stratum.

site: (1)A specific location of an activity or project, such as a campground, a lake, or a stand of trees to be harvested; (2) The location of a significant event, a prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined or vanished, where the location itself maintains historical or archeological value regardless of the value of any existing structure [36CFR65] (historic or archaeological definition).

site-potential tree: The average maximum height of the tallest trees for a given site class.

snag: A standing dead tree usually greater than five feet in height and six inches in diameter at breast height (d.b.h.).

social well-being: A condition that enables citizens, communities, and visitors to contribute to their wellness, values and quality of life.

society: A group of people who have a common homeland, are interdependent, and share a common culture.

soil: The earth material that has been so modified and acted upon by physical, chemical, and biological agents that it will support rooted plants.

soil function: The characteristic physical and biological activity of soils that influences productivity, capability, and resiliency.

soil productivity: The inherent capacity of a soil to produce plant growth, due to the soil's chemical, physical, and biological properties (such as depth, temperature, water-holding capacity, and mineral, nutrient, and organic matter content). It is often expressed by some measure of biomass accumulation.

soil quality: The capacity of a soil to function within ecosystem boundaries to sustain biological productivity, maintain environmental quality, and promote plant and animal health.

soil stability: (1) Mass stability of the soil profile or resistance to mass failure; (2) stability of the soil surface with respect to accelerated sheet, rill, and gully erosion processes.

soil surveys: All soil surveys are made by examining, describing, and classifying soils in the field and delineating their areas on maps. The map scale for field mapping must be large enough to allow areas of minimum size to be delineated legibly. Recognition of the different soil survey levels is helpful for communicating about soil surveys and maps, even though the levels cannot

be sharply separated from each other. The order of a survey is consequence of field procedures, the minimum size of delineation, and the kinds of map units that are used.

solid waste: Discarded solid waste materials resulting from mining, industrial, commercial, agricultural, silvicultural, and community activities. Does not include domestic sewage or pollutants such as silt, or dissolved materials in irrigation return flows.

source habitat: Habitat in such conditions that result in a positive or increasing population growth for a particular species. Those characteristics of vegetation that support long-term wildlife species persistence, or characteristics of vegetation that contribute to stable or positive population growth for a species in a specified area and time. Source habitats are described using dominant vegetation cover type and structural stage combinations that can be estimated reliably at the 247-acre (100-hectare) patch scale. Various combinations of these cover type–structural stages make up the source habitats for the terrestrial species discussed in this Final Environmental Impact Statement, and provide the range of vegetation conditions required by these species for food, reproduction, and other needs (Wisdom et al. 2000).

spatial: Related to or having the nature of space.

special habitat: A habitat which has a special function not provided by plant communities and successional stages. Includes riparian zones, snags, dead and downed wood, and edges (Thomas 1979).

specially designated areas: Also referred to as special areas and is one of the plan components. Areas designated because of their unique or special characteristics, such as botanical areas or areas designated by stature or administrative processes such as wilderness, wild and scenic rivers, or research natural areas.

special use authorization: A permit, term permit lease, or easement which allows occupancy, use, rights, or privileges of national forest lands (36 CFR 251.51).

special use permit: A special authorization which provides permission without conveying any interest in land, to occupy and use national forest land or facilities for specified purpose, and which is revocable, terminable and noncompensable.

species: A population or series of populations of organisms that can interbreed freely with each other but not with members of other species.

species composition: The species that occur on a site or in a successional stage of a plant community (Thomas 1979).

species diversity: The number of species occurring in a given area.

sprouter: Flora capable of vegetative reproduction from roots or stems.

stand: A contiguous group of trees sufficiently uniform in age class distribution, composition, and structure, and growing on a site of sufficiently uniform quality, to be a distinguishable unit, such as mixed, pure, even-aged, and uneven-aged stands.

stand composition: The proportion of each tree species in a stand expressed as a percentage of the total number, basal area, or volume of all tree species in the stand.

stand density (see also relative stand density): It is an absolute measure of tree occupancy per unit area, like trees per acre or basal area per acre. Stand density indicates the degree to which an area is occupied by trees and, hence the intensity by which trees are competing for site resources (Tappeiner 2007).

stand initiation stage (SI): Structural stage of young stands that develop following a stand-replacing disturbance such as wildfire or a regeneration timber harvest. Growing space is typically reoccupied rapidly by vegetation that either survives the disturbance or colonizes the area. Forest vegetation within these stands literally survive the disturbance above ground, or initiate growth from their underground roots or from seeds stored on-site. Colonizers also disperse seed into disturbed areas, the seed germinates and then new seedlings establish and develop. A single canopy layer of young trees is typically present in this stage. Average dominant tree diameters are usually less than five inches.

stand-replacement fire: A fire severity classification where at least 75 percent replacement of the upper layer of vegetation is removed.

stand structure: General term referring to the collection and spatial arrangement of species, tree sizes, canopy layers, and age-classes in a forest stand.

standard: A standard is a mandatory constraint on project and activity decisionmaking, established to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

state and transition model: Nonequilibrium ecological model to describe vegetation dynamics of rangeland sites as adopted by the Natural Resource Conservation Service. Models recognize multiple steady states of vegetation and emphasize disturbance processes.

stem exclusion stage: Structural stage is usually created when vigorous, fast growing trees that compete strongly with one another for available light and moisture occupy the growing space. Because trees are taller and the growing space is fully occupied, establishment of new trees is generally precluded by a lack of sunlight or moisture. Individuals that compete unsuccessfully are often stressed or die. These stands typically only have one dominant layer. Average overstory tree diameters usually range from 5 to 20 inches.

strategy: Part two of a land management plan that explains the suitable uses and includes the special designated areas, and management categories.

stream channel: Refer to channel.

stream class: Classification of streams based on the present and foreseeable uses made of the water and the potential effects of on-site changes in downstream uses. Four classes are defined as:

> **class I:** Perennial or intermittent streams that provide a source of water for domestic use; are used by large numbers of anadromous fish or significant sports fish for spawning, rearing, or migration; and/or are major tributaries to the other Class I streams.
>
> **class II:** Perennial or intermittent streams that are used by fish for spawning, rearing, or migration; and/or may be tributaries to Class I streams or other Class II streams.
>
> **class III:** Other perennial streams not meeting higher-class criteria.
>
> **class IV:** Other intermittent streams not meeting higher class criteria.

stringers: Relatively narrow areas suitable to be occupied by forested plant associations within a landscape that is otherwise unsuitable due to site or environmental factors.

stronghold: Directly associated with strong populations. For native fish, strong populations have stable numbers or are increasing, and all major life history forms that historically occurred within the watershed are present.

stocking level: A measure of stand density relative to a specific optimum that is set in accordance with management objectives.

structure (see also stand structure): (1) Any permanent building or facility, or part thereof such as barns, outhouses, residences, and storage sheds including transmission line systems, substations, commercial radio transmitters, relays or repeater stations, antennas, and other electronic sites and associated structures.

structural stage: One of five distinct classifications of stand structure used in the Final Environmental Impact Statement analysis process including; stand initiation (SI), stem exclusion (SE), understory reinitiation (UR), old forest single-story (OFSS) and old forest multi-story (OFMS).

subalpine: A terrestrial community that generally is found in harsher environments than the montane terrestrial community. Subalpine communities are generally colder than montane and support a unique clustering of wildlife species.

subbasin: In the National Hydrography Dataset, a subdivision of basins, also called HU8 (formerly HUC4) and denoted by an 8-digit numeric code. Subbasins in the Pacific Northwest have drainage areas averaging between 800,000 and 1,000,000 acres. The Upper John Day subbasin, for example, is denoted by the numeric descriptor 17070201; the North Fork John Day subbasin is 17070202, the Middle Fork John Day subbasin is 17070203, and the Lower John Day subbasin is 17070204. See also: basin, watershed, and subwatershed.

subsistence: Customary and traditional uses of wild renewable resources (plants and animals) for food, shelter, fuel, clothing, tools, etc.

subwatershed: In the National Hydrography Dataset, a subdivision of watersheds with drainage areas of approximately 20,000 acres, equivalent to a 6th-field (12-digit) HUC, or HU12 (formerly HUC6). Subwatersheds are the smallest hydrologic units described in the forest plans and FEIS although it is possible to delineate smaller subdivisions, for example HU14 (HUC7) and HU16 (HUC8). See also: basin, subbasin, and watershed.

succession: The sequential replacement over time of one plant community by another, in the absence of major disturbance. Conditions of the prior plant community or successional stage create conditions that are favorable for the establishment of the next stage. The different stages of succession are often referred to as seral stages. Developmental stages are as follows:

> **early seral:** Communities that occur early in the successional path and generally have less complex structural developmental than other successional communities. Seedling and sapling size classes are an example of early seral forests.
>
> **mid-seral:** Communities that occur in the middle of the successional path. For forests, this usually corresponds to the pole or medium sawtimber growth stages.
>
> **late-seral:** Communities that occur in the later stage of the successional path with mature, generally larger individuals, such as mature forests.

suitability: The appropriateness of applying certain resource management practices to a particular area of land, as determined by an analysis of the economic and environmental consequences and the alternative uses foregone. A unit of land may be suitable for a variety of individual or combined management practices.

suitable habitat: Habitat that currently has both the fixed and variable stand attributes for a given species habitat requirements. Variable attributes change over time and may include seral stage, cover type and overstory canopy cover.

suitable uses: Uses that are compatible with the desired conditions and objectives for a given area which are identified as guidance for project and activity decisionmaking and do not represent a commitment or final decision approving projects or activities.

surface fire: A fire that burns surface litter, dead woody fuels, other loose debris on the forest floor, and some small vegetation without significant movement into the overstory, usually with a flame less than a few feet high.

surface water development: The practice of diverting or impounding surface water sources by the construction of dams, diversions, canals, or ditches for use, such as irrigation, livestock watering, and human consumption.

surrogate species: A species that represents other species that share similar habitat and risk factors and include Region 6 sensitive species, State-listed species, or other species for which the published literature has identified a concern for their viability. The key characteristic of a surrogate species is that its status and trend provide insights to the integrity of the larger ecological system to which it belongs. Surrogate species serve an umbrella function in terms of encompassing habitats needed for other species, are sensitive to the changes likely to occur in the area, or otherwise serve as an indicator of ecological sustainability.

sustainability: Meeting needs of the present generation without compromising the ability of future generations to meet their needs. Sustainability is composed of desirable social, economic, and ecological conditions or trends interacting at varying spatial and temporal scales, embodying the principles of multiple-use and sustained-yield (FSM 1905).

sustained-yield of products and services: The achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the National Forest System without impairment of the productivity of the land.

T

talus: A slope formed by the accumulation of rock debris at the base of a cliff.

temporal: Related to time.

tentatively suitable forest land: Forest land that is producing or is capable of producing crops of industrial wood and: (a) has not been withdrawn by Congress, the Secretary, or the Chief; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils productivity, or watershed conditions; (c) existing technology or knowledge, as reflected in current research and experience, provides reasonable assurance that it is possible to restock adequately within 5 years after final harvest; and (d) adequate information is available to project responses to timber management activities.

terrestrial: Pertaining to the land.

terrestrial wildlife: Wildlife species that dwell primarily on land (Thomas 1979).

thermal cover: Cover used by animals to ameliorate effects of weather; for elk, a stand of coniferous trees 40 feet or more tall with an average crown closure of 70 percent or more, for deer, cover may include saplings, shrubs, or trees at least five feet tall with 75 percent crown closure.

thermal regulation: The processes by which many animals actively maintain the temperature of all or parts of their body; the protection against local climatic extremes provided by, for example, shade produced by vegetation, protection from wind or sun, or protection from extreme cold.

thinning: An intermediate treatment made to reduce stand density of trees primarily to improve growth, enhance forest health, or to recover potential mortality. Variations include crown thinning (thinning from above, high thinning), free thinning, low thinning (thinning from below), mechanical thinning (geometric thinning), and selection thinning (dominant thinning).

threatened species: Species listed under the Endangered Species Act by either the U.S. Fish and Wildlife Service or the National Marine Fisheries Service. These species are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

tiering: Refers to the coverage of general matters in broader environmental impact statements (such as the land management plan) with subsequent narrower statements or environmental analyses (such as an environmental impact statement or site–specific environmental assessment) incorporating, by reference, the general discussions and concentrating solely on the issues specific to the statement subsequently prepared.

timber harvest: The removal of trees for wood fiber utilization and other multiple-use purposes.

timber production: The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use. For purposes of this subpart, the term timber production does not include production of fuelwood.

timber sale program quantity (TSPQ): The volume of timber planned for sale during the first decade of the planning horizon. It includes the allowable sale quantity (chargeable volume) and any additional volume planned for sale from lands generally suitable for timber harvest. The timber sale program quantity usually is expressed as an annual average for the first decade.

total maximum daily load (TMDL): A calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources. The Clean Water Act, Section 303, establishes the water quality standards and TMDL programs.

traditional cultural areas: Those areas of the forest used by Native American Indian Tribes for traditional activities and often referred to as "religious use areas" or "sacred areas." They may include areas traditionally used for gathering of special forest products.

transportation facility jurisdiction: The legal right to control or regulate use of a transportation facility derived from fee title, an easement, an agreement, or other similar method. While jurisdiction requires authority, it does not necessarily reflect ownership.

travel corridors: An area of vegetation that provides completely or partially suitable habitat for animals to travel from one location to another.

travel route: A route, such as a county or national forest road or river or trail, that is open for use by members of the public.

treaty-reserved right: Tribal rights or interests reserved in treaties, by Native American Indian Tribes for the use and benefit of their members. The uses include such activities as described in the respective treaty document. Only Congress may abolish or modify treaties or treaty rights.

treaty resource: A resource associated with the language in a specific treaty, usually interpreted to include collections or association of species; not limited to a single species. For example: fish may include all fish species (some treaties included rights to erect temporary houses for curing fish); roots and berries may include a wide variety of plants that will encompass the nature of the plants as they were used historically; grasses are necessarily included for the treaty reserved right to graze cattle or livestock. Hunting rights may include all species of animals hunted in historic and prehistoric times. As these apply to the Forest Service, they are public natural resources on

national forest lands, to which American Indian Tribes have reserved certain rights for taking or gathering.

tree decadence: Trees per acre with spiked or deformed tops, bole, or root decay.

trend: As used to describe range conditions, the direction of change in range or forage condition or in ecological status toward or away from the desired condition.

Tribe: Term used to designate any native American Indian Tribe, band, nation, or other organized group or community which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians.

trust resource: A resource or property that constitutes a corpus or object of trust that is held in trust status by another (trustee) on behalf of a beneficiary. A trustee is usually a governmental entity (Secretary of the Interior) who is assigned a trust duty to care for resources that are for the exclusive use and benefit of Indian Tribes and/or their members. A beneficiary may be an Indian Tribe or individual tribal member, who has property being held in trust status, for example: land, money, timber, or any Indian-owned asset.

two-aged regeneration method: A planned sequence of silvicultural treatments designed to regenerate or maintain a stand with two age classes. The resulting stand may be two-aged or tend towards an uneven-aged condition as a consequence of both an extended period of regeneration establishment and the retention of reserve trees that may represent one or more age classes. (Two-aged regeneration harvests must comply with National Forest Management Act (NFMA) limitations for even-aged harvest methods).

U

underburn: A type of prescribed fire that burns ground vegetation and ladder fuels on the surface under a live tree overstory to meet specific management and/or resource objectives.

understory: The small trees and other woody species/shrubs whose crowns constitute the lowest horizontal layer of vegetation in a forest stand, growing under the canopy formed by taller trees.

understory reinitiation stage (UR): Structural stage forming as the forest continues to develop and new age classes of trees establish as individual overstory trees die or are removed. The original trees no longer occupy all of the growing space. Regrowth of understory vegetation then occurs, and trees begin to develop in vertical layers. This stage typically contains multiple layers and multiple tree sizes. Average tree overstory diameters range from 5 to 20 inches.

uneven-aged management: The application of a combination of actions needed to simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products. Cutting is usually regulated by specifying the number or proportion of trees of particular sizes to retain within each area, thereby maintaining a planned distribution of size classes. Cutting methods that develop and maintain uneven-aged stands are single-tree selection and group selection.

ungulates: Hoofed, plant-eating mammals such as elk, deer, and cattle.

upland: The portion of the landscape above the valley floor or stream.

unroaded area: Portion of the national forest that does not contain classified roads. Refer to road.

unsuitable forest land (not suited): Forest land not managed for timber production because: (a) Congress, the Secretary, or the Chief has withdrawn it; (b) it is not producing or capable of producing crops of industrial wood; (c) technology is not available to prevent irreversible damage to soils productivity, or watershed conditions; (d) there is no reasonable assurance based on existing technology and knowledge, that it is possible to restock lands within 5 years after final harvest, as reflected in current research and experience; (e) there is, at present, a lack of adequate information about responses to timber management activities; or (f) timber management is inconsistent with or not cost efficient in meeting the management requirements and multiple-use objectives specified in the forest plan.

unsuitable range: Areas of land that should not be used by livestock because of unstable soils.

utility corridor: A parcel of land, without fixed limits or boundaries that is being used as the location for one or more transportation or utility rights-of-way.

V

vascular plants: Plants that have specialized tissues which conduct nutrients, water, and sugars, along with other specialized parts such as roots, stems, and reproductive structures. Vascular plants include flowering plants, ferns, shrubs, grasses, trees, and many others.

vector: An organism that carries or transmits a pathogenic agent from one host to another.

vegetation management: Management activities such as thinning, harvesting, planting, pruning, prescribed burning, mastication, or site preparation that is designed to alter the establishment, growth, composition, health, and/or quality of forests, woodlands, grasslands, and shrublands to meet the diverse needs and values of landowners and society on a sustainable basis.

vegetation utilization: Indicates the degree to which vegetation is consumed by animals.

vertebrate: An animal with a backbone; mammals, fishes, birds, reptiles, and amphibians are vertebrates.

viability: In general, viability means the ability of a population of a plant or animal species to persist for some specified time into the future.

viable population: A population that is regarded as having the estimated numbers and distribution of reproductive individuals to ensure that its continued existence is well distributed in the Planning Area.

vision: Part one of a land management plan that describes the roles, contribution, and desired conditions of the national forest. This section also contains monitoring measures to assess progress toward the desired conditions.

W

water right: A right to use surface water or ground water evidenced by a court decree or by a permit or certificate approved by the state water resources department. Statutory exempt uses of surface water and ground water are not water rights, nor are time-limited licenses. A perfected water right is defined by applicant name, source, purpose, amount (quantity, rate and duty), season of use, priority date, point of diversion, place of use, and certificate number.

water quality: A term used to describe the chemical, physical, and biological characteristics of water, usually in respect to its suitability for a particular purpose.

watershed: (1) The region draining into a river, river system, or body of water; (2) also the divide, or ridgeline that separates two adjacent drainages; (3) In the terminology of the National Hydrography Dataset, subdivisions of a subbasin, ranging in size from 40,000 to 250,000 acres; the fifth level (10-digit) in the hydrologic hierarchy, and also called HU10 (formerly HUC5). See also: basin, subbasin, and subwatershed.

watershed condition classes: Watersheds are rated as Class 1, 2, or 3.

> **Class 1 Condition:** Watersheds exhibit high geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. Drainage network is generally stable. Physical, chemical, and biological] conditions suggest that soil, aquatic, and riparian systems are predominantly functional in terms of supporting beneficial uses.
>
> **Class 2 Condition:** Watersheds exhibit moderate geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. Portions of the watershed may exhibit an unstable drainage network. Physical, chemical, and biological conditions suggest that soil, aquatic, and riparian systems are at risk in being able to support beneficial uses.
>
> **Class 3 Condition:** Watersheds exhibit low geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. A majority of the drainage network may be unstable. Physical, chemical, and biological conditions suggest that soil, aquatic, and riparian systems do not support beneficial uses.

watershed function: The processes acting on hillslopes and stream channel within a drainage basin that control the movement of water, wood, sediment, and nutrients.

watershed integrity: The degree to which the physical and biological processes affecting the movement of water, sediment, wood, and nutrients are operating within normally expected ranges.

watershed runoff: Refer to runoff.

water yield: The amount of water that flows from a watershed within a specific period of time.

wetlands: Those areas that are inundated by surface or ground water with a frequency sufficient to support and under normal circumstances do or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds (Executive Order 11990, Section 7c).

wild and scenic river (WSR): Those rivers or sections of rivers designated as such by congressional action under the Wild and Scenic Rivers Act of 1968, as supplemented and amended. Wild and scenic rivers include all national forest lands within the designated wild and scenic river corridor (15). The following classifications are used:

> **wild river areas:** Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted.
>
> **scenic river areas:** Those rivers or sections of rivers that are free of impoundments, with watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

recreational river areas: Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

study river areas: Those rivers formally designated by Congress to be studied under Sections 5(a) and 5(b) of the Wild and Scenic Rivers Act.

wilderness area: An area designated by congressional action under the Wilderness Act of 1964. Wilderness is defined as undeveloped federal land retaining its primeval character and influence without permanent improvements or human habitation. Wildernesses are protected and managed to preserve their natural conditions, which generally appear to have been affected primarily by the forces of nature with the imprint of human activity substantially unnoticeable; have outstanding opportunities for solitude or a primitive and unconfined type of recreation; are of sufficient size to make practical their preservation, enjoyment, and use in an unimpaired condition; and may contain features of scientific, educational, scenic, or historical value as well as ecologic and geologic interest.

Wilderness Recreation Opportunity Spectrum (WROS): The Wilderness Recreation Opportunity Spectrum system was developed in conjunction with the Recreation Opportunity Spectrum (ROS). The terminology is similar, although settings are described in terms of pristine, primitive, and semi-primitive settings for wilderness. The descriptions of the primitive and semi-primitive settings for Wilderness Recreation Opportunity Spectrum differ slightly from the Recreation Opportunity Spectrum descriptions and, to avoid confusion with Recreation Opportunity Spectrum settings, are not abbreviated as acronyms.

Pristine: Visitation is very limited. Maintaining a natural and unmodified environment is emphasized. Visitors seldom and only temporarily displace wildlife throughout the year. This is the best opportunity for isolation and solitude, requiring a maximum degree of primitive skills, challenge, and risk. Access is difficult, requiring travel without trails or the use of routes created by animals or previous human visitation.

Primitive: Visitation is limited. The environment is essentially unmodified and natural with no long-term changes to the landscape except for facilities or structures that are deemed historically important to the area or experience. Signs of human use are minimal. Visitation does not displace wildlife during critical periods. High opportunity exists for exploring and experiencing considerable isolation and solitude. Primitive recreation skills are required with a high degree of challenge and risk. Access is via trails maintained to a “most difficult” standard.

Semi-primitive: Visitation is low to moderate. The environment is essentially unmodified and natural, with no long-term changes to the landscape, except for facilities or structures that are historically important to the area or experience. Visitation does not displace wildlife during critical periods. Moderate opportunity exists for exploring and experiencing isolation, independence, and closeness to nature. No-trace camping and primitive skills are required, with a moderate to high degree of challenge and risk. Access is via constructed and maintained trails managed to “more difficult” or “most difficult” standards.

wildfire: An unplanned, unwanted wildland fire, including unauthorized human-caused fires, escaped wildland fire use events, escaped prescribed fire projects, and all other wildland fire where the objective is to put the fire out.

wildland: A nonurban, natural area that contains uncultivated land, timber, range, watershed, brush or grassland.

wildland fire: Any nonstructure fire, other than prescribed fire, that occurs in the wildland. This term encompasses fires previously called both wildfires and prescribed natural fires (USDA and USDI 1998).

wildland fire situation analysis (WFSA): A decision-making process that evaluates alternative management strategies against selected safety, environmental, social, economic, political, and resource management objectives (USDA Forest Service 1998).

wildland fire suppression: An appropriate management response to wildland fire that results in curtailment of fire spread and eliminates all identified threats from the particular fire. All wildland fire suppression activities provide for firefighter and public safety as the highest consideration, but minimize loss of resource values, economic expenditures, and/or the use of critical firefighting resources (USDA Forest Service 1998).

wildland fire use (WFU): Formerly referred to as "prescribed natural fire." The application of the appropriate management response to naturally ignited wildland fires to accomplish specific resource management objectives within a set of predefined conditions of fuels, weather, and topography.

wildland-urban interface (WUI): The area directly adjacent to home and communities.

windthrown: Refers to trees blown over by the wind.

winter range: The area available to and used by wildlife (big game) during the winter season. Generally, lands below 4,000 feet in elevation, on south and west aspects, that provides forage and thermal/snow intercept.

woodland: Dry, low elevation areas with a potential vegetation type of juniper.

X

xeric: Very dry region or climate; tolerating or adapted to dry conditions. Dry soil moisture regime. Some moisture is present but does not occur at optimum levels for plant growth. Irrigation or summer fallow is often necessary for crop production.

References

A

Abele, S. C., V. A. Saab and E. O. Garton. 2004. Lewis's Woodpecker (*Melanerpes lewis*): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region, Available: http://www.fs.fed.us/r2/projects/scp/assessments/lewisswoodpecker.pdf.

Adams, H. D., M. Guardiola-Claramonte, G. A. Barron-Gafford, J. C. Villegas, D. D. Breshears, C. B. Zou, P. A. Troch and T. E. Huxman. 2009. Temperature sensitivity of drought-induced tree mortality portends increased regional die-off under global-change-type drought. Proceedings of the National Academy of Sciences. 106 (17): 7063-7066.

Agee, J. K. 1993. Fire ecology of Pacific Northwest forests. Island Press, Washington, DC.

Agee, J. K. 1998. The landscape ecology of western forest fire regimes. Northwest Science. 72 (Special Issue I): 24-34.

Agee, J. K. 2003. Historical range of variability in eastern Cascades forests, Washington, USA. Landscape Ecology. 18 (8): 725-740.

Agee, J. K. and K. R. Maruoka. 1994. Historical fire regimes of the Blue Mountains. U.S. Department of Agriculture, Forest Service, Blue Mountains Natural Resources Institute, La Grande, OR.

Agee, J. K. and C. N. Skinner. 2005. Basic principles of forest fuel reduction treatments. Forest Ecology and Management. 211 (1-2): 83-96.

Ager, A. and M. Hitchcock. 1994. HEICALC: Elk habitat-effectiveness index software. Wildlife Society Bulletin. 22 (1): 126-128.

Ager, A. A., M. A. Finney, B. K. Kerns and H. Maffei. 2007. Modeling wildfire risk to northern spotted owl (*Strix occidentalis caurina*) habitat in Central Oregon, USA. Forest Ecology and Management. 246 (1): 45-56.

Ager, A. A., B. K. Johnson, J. W. Kern and J. G. Kie. 2003. Daily and seasonal movements and habitat use by female Rocky Mountain elk and mule deer. Journal of Mammalogy. 84 (3): 1076-1088.

Ainsworth, E. A. and S. P. Long. 2005. What have we learned from 15 years of free-air CO2 enrichment (FACE)? A meta-analytic review of the responses of photosynthesis, canopy properties and plant production to rising CO2. New Phytologist. 165 (2): 351-372.

Ainsworth, E. A. and A. Rogers. 2007. The response of photosynthesis and stomatal conductance to rising (CO2): mechanisms and environmental interactions. Plant, Cell and Environment. 30 (3): 258-270.

Al-Chokhachy, R., T. A. Black, C. Thomas, C. H. Luce, B. Rieman, R. Cissel, A. Carlson, S. Hendrickson, E. K. Archer and J. L. Kershner. 2016. Linkages between unpaved forest roads and streambed sediment: why context matters in directing road restoration. Restoration Ecology. 24 (5): 589-598.

Al-Chokhachy, R., S. J. Wenger, D. J. Isaak and J. K. Kershner. 2013. Characterizing the thermal suitability of instream habitat for salmonids: a cautionary example from the Rocky Mountains. Transactions of the American Fisheries Society. 142 (3): 793-801.

Aldridge, C. L. and M. S. Boyce. 2007. Linking occurrence and fitness to persistence: Habitat-based approach for endangered greater sage-grouse. Ecological Applications. 17 (2): 508-526.

Aldridge, C. L., S. E. Nielsen, H. L. Beyer, M. S. Boyce, J. W. Connelly, S. T. Knick and M. A. Schroeder. 2008. Range-wide patterns of greater sage-grouse persistence. Diversity and Distributions. 14 (6): 983-994.

Alexander, R. R. 1986. Silvicultural systems and cutting methods for old-growth: spruce-fir forests in the Central Rocky Mountains. General Technical Report RM-GTR-126. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 33 p.

Allan, J. D. 1995. Stream ecology: structure and function of running waters. Chapman & Hall, New York.

Allen, C. D., A. K. Macalady, H. Chenchouni, D. Bachelet, N. McDowell, M. Vennetier, T. Kitzberger, A. Rigling, D. D. Breshears, E. H. Hogg, P. Gonzalez, R. Fensham, Z. Zhangm, J. Castro, N. Demidova, J.-H. Lim, G. Allard, S. W. Running, A. Semerci and N. Cobb. 2010. A global overview of drought and heat-induced tree mortality reveals emerging climate change risks for forests. Forest Ecology and Management. 259 (4): 660-684.

Allen, M. M. and P. W. Adams. 1997. Using slash to protect soils from compaction with a cut-to length harvest system in the Oregon Cascades. Draft Research Project Completion Report. College of Forestry, Department of Forest Engineering, Oregon State University, Corvallis, OR. 46 p.

Allen, M. M., M. Taratoot and P. W. Adams. 1999. Soil compaction and disturbance from skyline and mechanized partial cuttings for multiple resource objectives in western and northeastern Oregon, U.S.A., Sessions, J. and W. Chung, eds. International Mountain Logging and 10th Pacific Northwest Skyline Symposium, Corvallis, OR, Oregon State University, Forest Engineering Department, Corvallis, OR, 107-117.

Allen, S. D., D. A. Wickwar, F. P. Clark, R. R. Dow, R. Potts and S. A. Snyder. 2009. Values, beliefs, and attitudes technical guide for Forest Service land and resource management, planning, and decisionmaking. US Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

Altman, B. 2000. Conservation strategy for landbirds in the northern Rocky Mountains of eastern Oregon and Washington. American Bird Conservancy and Oregon-Washington Partners in Flight, 140 p.

Andelman, S. J., S. Beissinger, J. F. Cochrane, L. Gerber, P. Gomez-Priego, C. Groves, J. Haufler, R. Holthausen, D. Lee, L. Maguire, B. Noon, K. Ralls and H. Regan. 2001. Scientific standards for conducting viability assessments under the National Forest Management Act: report and recommendations of the NCRAS Working Group. Report, U. National Center for Ecological Analysis and Synthesis, University of California, Santa Barbara, CA.

Andelman, S. J. and W. F. Fagan. 2000. Umbrellas and flagships: efficient conservation surrogates or expensive mistakes? Proceedings of the National Academy of Sciences of the United States of America. 97 (11): 5954-5959.

Anderson, H. W. 1967. Snow accumulation as related to meteorological, topographic, and forest variables in central Sierra Nevada, California. International Association of Scientific Hydrology. Publication 78: 215-224.

Anderson, P. D. 2013. Two decades of learning about thinning in the ecosystem management era. In: Density management in the 21st century: west side story, Gen. Tech. Rep. PNW-GTR-880, Anderson, P. D. and K. L. Ronnenberg, eds. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 1-7.

Andrus, C. and H. A. Froehlich. 1983. An evaluation of four implements used to till compacted forest soils in the Pacific Northwest. Research Bulletin 45. Oregon State University, College of Forestry, Forest Research Lab, Corvallis, OR. 12 p.

Aplet, G. H. and W. S. Keeton. 1999. Application of historical range of variability concepts to biodiversity conservation. In: Practical approaches to the conservation of biological diversity, Baydack, R. K., I. H. Campa and J. B. Haufler, eds. Island Press, Washington, D.C., USA. Pages 71–86.

Araújo, M. B., M. Cabeza, W. Thuiller, L. Hannah and P. H. Williams. 2004. Would climate change drive species out of reserves? An assessment of existing reserve-selection methods. Global Change Biology. 10 (9): 1618-1626.

Archer, E., R. Al-Chokhachy, J. Heitke, P. Ebertowski, R. Leary, T. Romano and B. B. Roper. 2009. PACFISH INFISH biological opinion effectiveness monitoring program for streams and riparian areas 2009 Annual Summary Report. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fish and Aquatic Ecology Unit, Logan, Utah. 48 p.

Archer, E. and J. Ojala. 2016a. Stream habitat condition for sites in the Malheur National Forest. U.S. Department of Agriculture, Forest Service, PacFish/InFish Biological Opinion (PIBO) Monitoring Program, Logan, UT. 114 p.

Archer, E. and J. Ojala. 2016b. Stream habitat condition for sites in the Wallowa-Whitman National Forest. U.S. Department of Agriculture, Forest Service, PacFish / InFish Biological Opinion (PIBO) Monitoring Program, Logan, UT. 121 p.

Archer, E., J. Ojala and A. Van Wagenen. 2016. Stream habitat condition for sites in the Umatilla National Forest. U.S. Department of Agriculture, Forest Service, PacFish / InFish Biological Opinion (PIBO) Monitoring Program, Logan, UT. 84 p.

Archuleta, J. G. and J. G. Baxter. 2008. Subsoiling promotes native plant establishment on compacted forest sites. Native Plants Journal. 9 (2): 117-122.

Archuleta, J. G. and M. W. Karr. 2006. Subsoiling grapple rake U.S. Patent Grant US7086184B2. U.S. Department of Agriculture, Forest Service,

Arend, J. L. 1942. Infiltration as affected by the forest floor. Soil Science Society of America Proceedings. 6 (1): 430-435.

Armour, C. L., D. A. Duff and W. Elmore. 1994. The effects of livestock grazing on western riparian and stream ecosystems. Fisheries. 19 (9): 9-12.

Arno, S. F. and T. D. Peterson. 1983. Variation in estimates of fire intervals: A closer look at fire history on the Bitterroot National Forest. Research Paper RP-INT-301 (out of print, cited in Hann et al. 2004). U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station, Ogden, UT.

Association for Fire Ecology [AFE]. 2009. The role of fire in managing long term carbon storage: Key challenges. Position Paper. Eugene, OR. 4p.

Aubry, C., D. Goheen, R. Shoal, T. Ohlson, T. Lorenz, A. Bower, C. Mehmel and R. Sniezko. 2008. Whitebark pine restoration strategy for the Pacific Northwest Region, Executive Summary. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region,

Aubry, K. B., K. S. McKelvey and J. P. Copeland. 2007. Distribution and broadscale habitat relations of the wolverine in the contiguous United States. The Journal of Wildlife Management. 71 (7): 2147-2158.

B

Bachelet, D., J. M. Lenihan, C. Daly, R. P. Neilson, D. S. Ojima and W. J. Parton. 2001a. MC1: a dynamic vegetation model for estimating the distribution of vegetation and associated carbon, nutrients, and water—technical documentation. Version 1.0. General Technical Report PNW-GTR-508. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 95 p.

Bachelet, D. R., R. P. Neilson, J. M. Lenchan and R. J. Drapek. 2001b. Climate change effects on vegetation distribution and carbon budgets in the United States. Ecosystems. 4 (3): 164-185.

Bacon, W. 1974. The visual management system. In: National forest landscape management, Agricultural Handbook No. 462 (Vol.2), U.S. Government Printing Office, Washington, DC.

Bagne, K. E., K. L. Purcell and J. T. Rotenberry. 2008. Prescribed fire, snag population dynamics, and avian nest site selection. Forest Ecology and Management. 255 (1): 99-105.

Bailey, D. W. 2001. Evaluating new approaches to improve livestock grazing distribution using GPS and GIS technology, 1st National Conference on Grazing Lands, Las Vegas, NV, 91-99.

Bailey, V. 1936. The mammals and life zones of Oregon. U.S. Govt. Print. Off., Washington, D.C. 416 p.

Baker, B. W., H. C. Ducharme, D. C. S. Mitchell, T. R. Stanley and H. R. Peinetti. 2005. Interaction of beaver and elk herbivory reduces standing crop of willow. Ecological Applications. 15 (1): 110-118.

Baker, W. L. 2012. Implications of spatially extensive historical data from surveys for restoring dry forests of Oregon's eastern Cascades. Ecosphere. 3 (3): 1-39.

Baker, W. L. 2015. Historical Northern spotted owl habitat and old-growth dry forests maintained by mixed-severity wildfires. Landscape Ecology. 30 (4): 655-666.

Bale, J. S., G. J. Masters, I. D. Hodkinson, C. Awmack, T. M. Bezemer, V. K. Brown, J. Butterfield, A. Buse, J. C. Coulson, J. Farrar, J. E. G. Good, R. Harrington, S. Hartley, T. H. Jones, R. L. Lindroth, M. C. Press, I. Symrnioudis, A. D. Watt and J. B. Whittaker. 2002. Herbivory in global climate change research: direct effects of rising temperature on insect herbivores. Global Change Biology. 8 (1): 1-16.

Banci, V. 1994. Wolverine. In: The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States, Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, L. J. Lyon and W. J. Zielinski, eds. USDA Forest Service Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado. 99–127.

Bangs, E. E., S. H. Fritts, J. A. Fontaine, D. W. Smith, K. M. Murphy, C. M. Mack and C. C. Niemeyer. 1998. Status of gray wolf restoration in Montana, Idaho, and Wyoming. Wildlife Society Bulletin. 26 (4): 785-798.

Barnett, T. P., J. C. Adam and D. P. Lettenmaier. 2005. Potential impacts of a warming climate on water availability in snow-dominated regions. Nature. 438 (17 November 2005): 303-309.

Barrett, S., D. Havlina, J. Jones, W. Hann, C. Frame, D. Hamilton, K. Schon, T. Demeo, L. Hutter and J. Menakis. 2010. Interagency fire regime condition class (FRCC) guidebook. FRCC Guidebook Version 3.0. National Interagency Fuels, Fire & Vegetation Technology Transfer, USDA Forest Service, US Department of the Interior, and The Nature Conservancy, Available: https://www.frames.gov/catalog/7793. Online. 132 p.

Barrett, S. W. and S. F. Arno. 1982. Indian fires as an ecological influence in the Northern Rockies. Journal of Forestry. 80 (10): 647-651.

Barrett, S. W., S. F. Arno and J. P. Menakis. 1997. Fire episodes in the Inland Northwest (1540-1940) based on fire history data. General Technical Report INT-GTR-370. U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Ogden, UT. 17 p.

Bart, J., S. Droege, P. Geissler, B. Peterjohn and C. J. Ralph. 2004. Density estimation in wildlife surveys. Wildlife Society Bullet. 32 (4): 1242-1247.

Bartholow, J. M. 2005. Recent water temperature trends in the Lower Klamath River, California. Journal of Fisheries Management. 25: 152-162.

Bartmann, R. M. 1983. Composition and quality of mule deer diets on pinyon-juniper winter range, Colorado. Journal of Range Management. 36 (4): 534-541.

Bate, L. J., M. J. Wisdom and B. C. Wales. 2007. Snag densities in relation to human access and associated management factors in forests of northeastern Oregon, USA. Landscape and Urban Planning. 80 (3): 278-291.

Battin, J., M. W. Wiley, M. H. Ruckelshaus, R. N. Palmer, E. Korb, K. K. Bartz and H. Imaki. 2007. Projected impacts of climate change on salmon habitat restoration. Proceedings of the National Academy of Sciences. 104 (16): 6720-6725.

Bauhus, J., K. Puettmann and C. Messier. 2009. Silviculture for old-growth attributes. Forest Ecology and Management. 258 (4): 525-537.

Baydeck, R. K., H. Campa, III and J. B. Haufler. 1999. Practical approaches to the conservation of biological diversity. Island Press, Washington, D.C.

Bêche, L. A., S. L. Stephens and V. H. Resh. 2005. Effects of prescribed fire on a Sierra Nevada (California, USA) stream and its riparian zone. Forest Ecology and Management. 218 (1-3): 35-79.

Beck, J. L., J. T. Flinders, D. R. Nelson, G. L. Clyde, H. D. Smith and P. J. Hardin. 1997. Diet selection and importance of management indicator species to elk and domestic sheep in a north-central Utah aspen ecosystem. deVos, J. C. Proceedings of the 1997 deer/elk workshop. Arizona Game and Fish Department, Rio Rico, AZ. 131-137.

Beck, J. L. and D. L. Mitchell. 2000. Influences of livestock grazing on sage grouse habitat. Wildlife Society Bulletin. 28 (4): 993-1002.

Beckley, T., J. Parkins and R. Stedman. 2002. Indicators of forest-dependent community sustainability: The evolution of research. The Forestry Chronicle. 78 (5): 626-636.

Beebee, T. J. C. 1995. Amphibian breeding and climate. Nature. 374 (6519): 219-220.

Beier, P. 1993. Determining minimum habitat areas and habitat corridors for cougars. Conservation Biology. 7 (1): 94-108.

Beissinger, S. and D. McCullough. 2002. Population viability analysis. In: Population Viability Analysis, Beissinger, S. and D. McCullough, eds. University of Chicago Press, Chicago, Illinois. 577 p.

Belnap, J., R. Rosentreter, S. Leonard, J. H. Kaltenecker, J. Williams and D. Eldridge. 2001. Biological soil crusts: ecology and management. Technical Reference 1730-2. U.S. Department of the Interior, Bureau of Land Management, Denver, CO. 119 p.

Belsky, A. J. and D. M. Blumenthal. 1997. Effects of livestock grazing on stand dynamics and soils in upland forests of the interior west. Conservation Biology. 11 (2): 315-327.

Benda, L., M. A. Hassan, M. Church and C. L. May. 2005. Geomorphology of steepland headwaters: the transition from hillslopes to channels. Journal of the American Water Resources Association. 41 (4): 835-851.

Benda, L., D. Miller, D. Martin, R. Bilby, C. Veldhuisen and T. Dunne. 2003. Wood recruitment processes and wood budgeting. In: The ecology and management of wood in world rivers, AFS Symposium 37, Gregory, S. V., K. L. Boyer and A. M. Gurnell, eds. American Fisheries Society, Bethesda, Maryland. 49-73.

Bendix, J. and C. R. Hupp. 2000. Hydrological and geomorphological impacts on riparian plant communities. Hydrological Processes. 14 (16-17): 2977-2990.

Bengeyfield, P. 2006. Managing cows with streams in mind. Rangelands. 28 (1): 3-6.

Bennett, A. F. 1999. Linkages in the landscape: The role of corridors and connectivity in wildlife conservation. IUCN Forest Conservation Programme, Cambridge, UK.

Bennett, A. F. 2003. Linkages in the landscape: the role of corridors and connectivity in wildlife conservation. IUCN, Gland, Switzerland and Cambridge, UK.

Bentz, B., J. Logan, J. MacMahon, C. D. Allen, M. Ayres, E. Berg, A. Carroll, M. Hansen, J. Hicke and L. Joyce. 2009. Bark beetle outbreaks in western North America: Causes and consequences, Bents, B. and J. Logan, eds. Beetle Bark Symposium, Snowbird, UT,

Bentz, B. J., J. Régnière, C. J. Fettig, E. M. Hansen, J. L. Hayes, J. A. Hicke, R. G. Kelsey, J. F. Negrón and S. J. Seybold. 2010. Climate change and bark beetles of the western United States and Canada: direct and indirect effects. BioScience. 60 (8): 602-613.

Berger, J. 1990. Persistence of different-sized populations: an empirical assessment of rapid extinctions in bighorn sheep. Conservation Biology. 4 (1): 91-98.

Besser, T. E., E. F. Cassirer, K. A. Potter, K. Lahmers, J. L. Oaks, S. Shanthalingam, S. Srikumaran and W. J. Foreyt. 2014. Epizootic pneumonia of bighorn sheep following experimental exposure to *Mycoplasma ovipneumoniae*. PLosOne. 9 (10): e110039.

Besser, T. E., M. A. Highland, K. Baker, E. F. Cassirer, N. J. Anderson, J. M. Ramsey, K. Mansfield, D. L. Bruning, P. Wolff and J. B. Smith. 2012. Causes of pneumonia epizootics among bighorn sheep, western United States, 2008–2010. Emerging Infectious Diseases. 18 (3): 406-414.

Bestelmeyer, B. T., A. J. Tugel, G. L. Peacock, D. G. Robinett, P. L. Shaver, J. R. Brown, J. E. Herrick, H. Sanchez and K. M. Havstad. 2009. State-and-transition models for heterogeneous landscapes: a strategy for development and application Rangeland Ecology & Management. 62 (1): 1-15.

Betson, R. P. 1964. What is watershed runoff? Journal of Geophysical Research. 69 (8): 1541-1551.

Bilby, R. E. and P. A. Bisson. 1992. Allocthonous versus autochthonous organic matter contributions to the trophic support of fish populations in clear-cut and old-growth forested streams. Canadian Journal of Fisheries and Aquatic Sciences. 49 (3): 540-551.

Bilby, R. E., K. Sullivan and S. H. Duncan. 1989. The generation and fate of road surface sediment in forested watersheds in southwestern Washington. Forest Science. 35 (2): 453-468.

Bisson, P. A., G. H. Reeves, R. E. Bilby and R. J. Naiman. 1997. Watershed management and Pacific salmon: desired future conditions. In: Pacific Salmon and Their Ecosystems: Status and Future Options, Stouder, D. J., P. A. Bisson and R. J. Naiman, eds. Chapman & Hall, New York. 447-474.

Black, S. H. 2005. Logging to control insects: the science and myths behind managing forest insect “pests.” A synthesis of independently reviewed research. The Xerces Society for Invertebrate Conservation, Portland, OR. 82 p.

Black, S. H., M. Shepherd and M. Vaughan. 2011. Rangeland management for pollinators. Rangelands. 33: 9-13.

Black, T., C. Luce, R. Cissel, N. Nelson and B. Staab. 2017. Legacy Roads Monitoring Project: GRAIP Multi-site Synthesis, Annual Watershed-Aquatics Program Managers Meeting, The Dalles, OR, U.S. Department of Agriculture, Forest Service, Pacific Northwest Region,

Blackburn, W. H. 1983. Livestock grazing impacts on watersheds. Rangelands. 5 (3): 123-125.

Bledsoe, B. P. and C. C. Watson. 2001. Logistic analysis of channel pattern thresholds: meandering, braiding, and incising. Geomorphology. 38: 281-300.

Bledsoe, B. P., C. C. Watson and D. S. Biedenharn. 2002. Quantification of incised channel evolution and equilibrium. Journal of the American Water Resources Association. 38 (3): 861-869.

Bliss, T. 2006. Model assumptions for soil disturbance. Unpublished. Wallowa-Whitman National Forest, Baker City, OR. 5.

Bock, C. E. 1970. The ecology and behavior of the Lewis' woodpecker (Asyndesmus lewis). University of California Publication of Zoology. 92: 1-100.

Bock, C. E., V. A. saab, T. D. Rich and D. S. Dobkin. 1993. Effects of livestock grazing on neotropical migratory landbirds in western North America. In: Status and Management of Neotropical Migratory Birds; Proc. of the Symposium, Finch, D. M. and P. W. Stangel, eds. USDA Forest Service, 296-309.

Bohn, B. A. and J. L. Kershner. 2002. Establishing aquatic restoration priorities using a watershed approach. Journal of Environmental Management. 64 (4): 355-363.

Bolon, N. A. 1994. Estimates of the values of elk in the Blue Mountains of Oregon and Washington: evidence from existing literature. PNW-GTR-316. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 38 p.

Borman, M. M. 2005. Forest stand dynamics and livestock grazing in historical context. Conservation Biology. 19 (5): 1658-1662.

Bosch, J. M. and J. D. Hewlett. 1982. A review of catchment experiments to determine the effects of vegetation changes on water yield and evapotranspiration. Journal of Hydrology. 55 (1-4): 3-23.

Bowling, L. C. and D. P. Lettenmaier. 2001. The effects of forest roads and harvest on catchment hydrology in a mountainous maritime environment. In: Human Influence on Hydrology and Geomorphology in Urban and Forest Areas, Water Sci. Appl., vol. 2, Wigmosta, M. S. and S. J. Burges, eds. American Geophysical Union, Washington, D. C. 145-164.

Bowman, J. 2003. Is dispersal distance of birds proportional to territory size? Canadian Journal of Zoology. 81: 195-202.

Boyd, R. J. and A. Y. Cooperrider. 1986. Ungulates. In: Inventory and monitoring of wildlife habitat, Cooperrider, A. Y. and others, eds. U.S. Department of Interior, Bureau of Land Management, Denver, CO. Pages 519-566.

Boyle, S. A. and F. B. Samson. 1985. Effects of nonconsumptive recreation on wildlife: A review. Wildlife Society Bulletin. 13 (2): 110-116.

Bracken, L. J. and J. Croke. 2007. The concept of hydrological connectivity and its contribution to understanding runoff-dominated geomorphic systems. Hydrological Processes. 21 (13): 1749-1763.

Bradley, B. A. 2010. Assessing ecosystem threats from global and regional change: hierarchical modeling of risk to sagebrush ecosystems from climate change, land use and invasive species in Nevada, USA. Ecography. 33 (1): 198-208.

Bradley, B. A., M. Oppenheimer and D. S. Wilcove. 2009. Climate change and plant invasions: restoration opportunities ahead? Global Change Biology. 15: 1511-1521.

Brady, N. C. 1990. The nature and properties of soils. MacMillan Publishers, Ltd., New York.

Bragg, D. C. 2004. A prescription for old-growth-like characteristics in southern pines, Shepperd, W. D. and L. G. Eskew, eds. 2003 National Silviculture Workshop, RMRS-P-34, Granby, CO, U.S. Department of Agriculture Forest Service, Rocky Mountain Research Station, 80-92.

Brandt, J. 1987. The effect of different types of forest management on the transformation of rainfall energy by the canopy in relation to soil erosion, Forest hydrology and watershed management, Proceedings of the Vancouver Symposium, Vancouver, British Columbia, IAHS-AISH Publication No. 167, 213-222.

Brawn, J. D. and R. P. Balda. 1988. Population biology of cavity nesters in northern Arizona: Do nest sites limit breeding densities? The Condor. 90 (1): 61-71.

Brewer, C., V. C. Bleich, J. Foster, T. Hosch-Hebdon, D. McWhirter, E. Rominger, M. Wagner and B. Wiedman. 2014. Bighorn sheep: conservation challenges and management strategies for the 21st century. Wild Sheep Working Group, Western Association of Fish and Wildlife Agencies,

Bright, G. A. 1994. An extensive reconnaissance of the Wenaha National Forest in 1913. Powell, D. C., ed. Tech. Pub. F14-SO-08-94. U.S. Department of Agriculture, Forest Service, Umatilla National Forest, Pendleton, OR. 63 p.

Briske, D. D., J. D. Derner, J. R. Brown, S. D. Fuhlendorf, W. R. Teague, K. M. Havstad, R. L. Gillen, A. J. Ash and W. D. Willms. 2008. Rotational grazing on rangelands: reconciliation of perception and experimental evidence. Rangeland Ecology & Management. 61 (1): 3-17.

Briske, D. D. and J. H. Richards. 1994. Physiological responses of individual plants to grazing: current status and ecological significance, Vavra, M., W. A. Laycock and R. D. Pieper, eds. Proceedings, Ecological implications of livestock herbivory in the west, Denver, CO, Society for Range Management, 147-176.

Brookes, M. H., R. W. Campbell, J. J. Colbert, R. G. Mitchell and R. W. Stark. 1987. Western Spruce Budworm. Tech. Bull. No. 1694. USDA Forest Service, Cooperative State Research Service, 198 p.

Brooks, M., J. Colbert, R. G. Mitchell and R. Stark. 1987. Western spruce budworm. Technical Bulletin 1696. U.S. Department of Agriculture, Forest Service, Cooperative State Research, Washington, DC. 87p.

Brookshire, J. E., J. B. Kauffman, D. Lytjen and N. Otting. 2002. Cumulative effects of wild ungulate and livestock herbivory on riparian willows. Oecologia. 132 (4): 559-566.

Brostom, J., K. Buelow, T. Copeland, C. Peery, D. Statler and K. Thompson. 2017. Pacific lamprey 2017 regional implementation plan for the Snake River region: Lower Snake, Clearwater and Salmon regional management units. U.S. Fish and Wildlife Service, Portland, OR. 15 p.

Brown, J. K. and L. S. Bradshaw. 1994. Comparisons of particulate-emissions and smoke impacts from presettlement, full suppression, and prescribed natural fire period in the Selway-Bitterroot wilderness. International Journal of Wildland Fire. 4 (3): 143-155.

Brubaker, L. B. 1980. Spatial patterns of tree growth anomalies in the Pacific Northwest. Ecology. 61: 798-807.

Brunson, M. W. and L. Huntsinger. 2008. Ranching as a conservation strategy: can old ranchers save the new west? Rangeland Ecology & Management. 61 (2): 137-147.

Bryant, L. D. 1982. Response of livestock to riparian zone exclusion. Journal of Range Management. 35 (6): 780-785.

Buffington, J. M., T. E. Lisle, R. D. Woodsmith and S. Hilton. 2002. Controls on the size and occurrence of pools in coarse-grained forest rivers. River Research and Applications. 18 (6): 507-531.

Buffington, J. M. and D. R. Montgomery. 2013. Geomorphic classification of rivers. In: Treatise on Geomorphology; Fluvial Geomorphology, Vol. 9, Shroder, J. and E. Wohl, eds. Academic Press, San Diego. 730-767.

Buhl, C., A. Kanaskie, S. Navarro, W. Williams, D. Norlander, A. Nelson and R. Schroeter. 2016. Forest health highlights in Oregon—2015. Oregon Department of Forestry, Forest Health Program, Salem, OR. 32p.

Bull, E. L. 1987. Ecology of the pileated woodpecker in northeastern Oregon. Journal of Wildlife Management. 51 (2): 472-481.

Bull, E. L. 2001. Survivorship of pileated woodpeckers in northeastern Oregon Journal of Field Ornithology. 72 (1): 131-135.

Bumbaco, K. A. and P. W. Mote. 2010. Three recent flavors of drought in the Pacific Northwest. Journal of Applied Meteorology and Climatology. 49 (9): 2058-2068.

Bunnell, F. L., L. L. Kremsater and R. W. Wells. 1997. Likely consequences of forest management on terrestrial, forest-dwelling vertebrates in Oregon: A study commissioned by the Oregon Forest Resource Institute, Centre for Applied Conservation Biology, University of British Columbia, 130 pp.

Bunnell, F. L., K. L. Parker, R. S. McNay and F. W. Hovey. 1990. Sinking depths of black-tailed deer in snow, and their indices. Canadian Journal of Zoology. 68 (5): 917-922.

Burkhardt, J. W. 1997. Grazing utilization limits: an ineffective management tool. Rangelands. 19 (3): 8-9.

Burns, R. M. and B. H. Honkala. 1990. Silvics of North America. United States Department of Agriculture, Washington, DC.

Burroughs, E. R., Jr. and J. G. King. 1989. Reduction of soil erosion on forest roads. General Technical Report INT-264. USDA Forest Service, Intermountain Research Station, Ogden, Utah. 21 pp.

Burton, P., D. Kneeshaw and D. Coates. 1999. Managing forest harvesting to maintain old growth in boreal and sub-boreal forests. The Forestry Chronicle. 75 (4): 623-631.

Burton, T. A., S. J. Smith and E. C. Cowley. 2011. Multiple indicator monitoring (MIM) of stream channels and streamside vegetation. Technical Reference 1737-23 (Revised). U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. 155 p.

Bury, B. R. and J. A. Whelan. 1984. Ecology and management of the bullfrog. U.S. Fish and Wildlife Service, Washington, DC.

Busse, M. D., S. E. Beattie, R. F. Powers, F. G. Sanchez and A. E. Tiarks. 2006. Microbial community responses in forest mineral soil to compaction, organic matter removal, and vegetation control. Canadian Journal of Forest Research. 36 (3): 577-588.

C

Cahall, R. E. and J. P. Hayes. 2009. Influences of postfire salvage logging on forest birds in the eastern Cascades, Oregon, USA. Forest Ecology and Management. 257 (3): 1119-1128.

Caldwell, M. M., J. H. Richards, D. A. Johnson, R. S. Nowak and R. S. Dzurec. 1981. Coping with herbivory: photosynthetic capacity and resource allocation in two semiarid Agropyron bunchgrasses. Oecologia. 50 (1): 14-24.

Call, M. W. and C. Maser. 1985. Wildlife habitats in managed rangeland--the Great Basin of southeastern Oregon: sage grouse. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 30 p.

Camp, V. E. and P. R. Hooper. 1981. Geologic studies of the Columbia Plateau: Part I. Late Cenozoic evolution of the southeast part of the Columbia River Basalt Province Geological Society of America Bulletin. 92 (9): 659-668.

Campbell, R. W. 1993. Population dynamics of the major North American needle-eating budworms. Res. Pap. PNW-RP-463. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

Campbell, S. and L. Liegel. 1996. Disturbance and forest health in Oregon and Washington. General Technical Report PNW-GTR-381. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, Oregon. 121 p.

Cannon, S. H., J. E. Gartner, M. G. Rupert, J. A. Michael, A. H. Rea and C. Parrett. 2010. Predicting the probability and volume of postwildfire debris flows in the intermountain western United States. Geological Society of America Bulletin. 122 (1-2): 127-144.

Cantwell, M. D. and R. T. T. Forman. 1993. Landscape graphs: ecological modeling with graph theory to detect configurations common to diverse landscapes. Landscape Ecology. 8 (4): 239-255.

Caplow, F. 2002. *Silene spaldingii Wats*. (Spalding's catchfly) field inventory and management recommendations. Washington State Department of Natural Resources, Natural Heritage Program, Olympia, Washington. 6 p. plus appendix.

Carex Working Group. 2008. Sedge News, http://www.carexworkinggroup.com/pages/october2008.html, downloaded 12.1.2011.

Carey, C. and M. A. Alexander. 2003. Climate change and amphibian declines: is there a link? Diversity & Distributions. 9 (2): 111-121.

Carmichael, R. W., J. Ruzycki, M. Flesher and D. Eddy. 2005. Life history characteristics of *Oncorhynchus mykiss*: evidence for anadromous-resident reproductive linkage, Steelhead Workshop, Yakima, Washington, Yakama Indian Nation, available at: Available at: http://ykfp.org/steelheadworkshop/

Carney, K. M., B. A. Hungate, B. G. Drake and J. P. Megonigal. 2007. Altered soil microbial community at elevated CO2 leads to loss of soil carbon. Proceedings of the National Academy of Sciences. 104 (12): 4990-4995.

Carpenter, T. E., V. L. Coggins, C. McCarthy, C. S. O'Brien, J. M. O'Brien and T. J. Schommer. 2014. A spatial risk assessment of bighorn sheep extirpation by grazing domestic sheep on public lands. Preventitive Veterinary Medicine. 114 (1): 3-10.

Carroll, C., J. R. Dunk and A. Moilanen. 2010. Optimizing resiliency of reserve networks to climate change: multispecies conservation planning in the Pacific Northwest, USA. Global Change Biology. 16 (3): 891-904.

Carroll, C., R. F. Noss and P. C. Paquet. 2001. Carnivores as focal species for conservation planning in the Rocky Mountain region. Ecological Applications. 11 (4): 961-980.

Carroll, C., M. K. Phillips, C. A. Lopez-Gonzalez and N. H. Schumaker. 2006. Defining recovery goals and strategies for endangered species: the wolf as a case study. BioScience. 56 (1): 25-37.

Carroll, C., M. K. Phillips, N. H. Schumaker and D. W. Smith. 2003. Impacts of landscape change on wolf restoration success: Planning a reintroduction program based on static and dynamic spatial models. Conservation Biology. 17 (2): 536-548.

Carroll, M. J., B. J. Anderson, T. M. Brereton, S. J. Knight, O. Kudrna and C. D. Thomas. 2009. Climate change and translocations: The potential to re-establish two regionally-extinct butterfly species in Britain. Biological Conservation. 142 (10): 2114-2121.

Case, A. and A. Deaton. 2017. Mortality and morbidity in the 21st century. Brookings papers on economic activity. 2017: 397.

Cassidy, K. M. and C. E. Grue. 2000. The role of private and public lands in conservation of at-risk vertebrates in Washington State. Wildlife Society Bulletin. 28 (4): 1060-1076.

Castelle, A. J. and A. W. Johnson. 2000. Riparian vegetation effectiveness. Technical Bulletin 799. National Council of the Paper Industry for Air and Stream and Improvement, Inc. (NCASI), Research Triangle Park, North Carolina.

Catchings, R. D. and W. D. Mooney. 1988. Crustal structure of the Columbia Plateau: Evidence for continental rifting. Journal of Geophysical Research. 93 (B1): 459-474.

Cayan, D. R., S. A. Kammerdiener, M. D. Dettinger, J. M. Caprio and D. H. Peterson. 2001. Changes in the onset of spring in the western United States. Bulletin of the American Meteorological Society. 82 (3): 399-415.

Cederholm, C. J., L. M. Reid and E. O. Salo. 1981. Cumulative effects of logging road sediment on salmonid populations of the Clearwater River, Jefferson County, Washington, Proceedings of conference on salmon spawning gravel: a renewable resource in the Pacific Northwest? UW Contribution 543, Pullman, Washington, Washington State University, Water Research Center, 35 p.

Certini, G. 2005. Effects of fire on properties of forest soils: a review. Oecologia. 143 (1): 1-10.

Cerveny, L. K., K. Biedenweg and R. McLain. 2017. Mapping meaningful places on Washington's Olympic Peninsula: toward a deeper understanding of landscape values. Environmental management. 60 (4): 643-664.

Chadde, S. W., J. S. Shelly, R. J. Bursik, R. K. Moseley, A. G. Evenden, M. Mantas, F. Rabe and B. Heidel. 1998. Peatlands on National Forests of the Northern Rocky Mountains: ecology and conservation. General Technical Report, RMRS-GTR-11. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ogden, UT.

Chamaillé-Jammes, S., M. Massot, P. Aragón and J. Clobert. 2006. Global warming and positive fitness response in mountain populations of common lizards Lacerta vivipara. Global Change Biology. 12 (2): 392-402.

Chamberlin, T. W., R. D. Harr and F. H. Everest. 1991. Timber harvesting, silviculture, and watershed processes. In: Influences of forest and rangeland management on salmonid fishes and their habitats, Meehan, W. R., ed. American Fisheries Society, Bethesda, Maryland. 181-206.

Chambers, J. C. and M. Pellant. 2008. Climate change impacts on northwestern and intermountain United States rangelands. Rangelands. 30 (3): 29-33.

Chambers, M. E., P. J. Fornwalt, S. L. Malone and M. A. Battaglia. 2016. Patterns of conifer regeneration following high severity wildfire in ponderosa pine–dominated forests of the Colorado Front Range. Forest Ecology and Management. 378: 57-67.

Charnley, S. and J. K. Long. 2014. Managing forest products for community benefit. Gen. Tech. Rep. PSW-GTR-247. U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station, Albany, CA. 629-661.

Chen, J. 1991. Edge effects: microclimatic patterns and biological responses in old-growth Douglas-fir forests. Ph.D. dissertation, University of Washington, Seattle. 174 p.

Chiarucci, A., M. B. Araújo, G. Decocq, C. Beierkuhnlein, Fernández and J. M. Palacios. 2010. The concept of potential natural vegetation: an epitaph? Journal of Vegetation Science. 21 (6): 1172-1178.

Childs, S. W., S. P. Shade, D. W. R. Miles, E. Shepard and H. A. Froehlich. 1989. Soil physical properties: importance to long-term forest productivity. In: Maintaining the long-term productivity of Pacific Northwest forests, Perry, D. A., R. Meurisse, B. Thomas, R. Miller, J. Boyle, J. Means, C. R. Perry and R. F. Powers, eds. Timber Press, Portland, OR. 53-66.

Churchill, D., A. Larson, M. Dahlgreen, J. Franklin, P. Hessburg and J. Lutz. 2013. Restoring forest resilience: From reference spatial patterns to silvicultural prescriptions and monitoring. Forest Ecology and Management. 291 (442-457)

Ciesla, W. 2011. Forest entomology: a global perspective. Wiley, New York.

Ciuti, S., T. B. Muhly, D. G. Paton, A. D. McDevitt, M. Musiani and M. S. Boyce. 2012. Human selection of elk behavioural traits in a landscape of fear. Proceedings of the Royal Society B: Biological Sciences. DOI: 10.1098/rspb.2012.1483

Clark, B. and M. Miller. 2001. Fire effects guide. National Wildfire Coordinating Group.

Clark, P. E., W. C. Krueger, L. D. Bryant and D. R. Thomas. 2000. Livestock grazing effects on forage quality of elk winter range. Journal of Range Management. 53 (1): 97-105.

Clary, W. P. 1995. Vegetation and soil responses to grazing simulation on riparian meadows. Journal of Range Management. 48 (1): 18-25.

Clary, W. P. and W. C. Leininger. 2000. Stubble height as a tool for management of riparian areas. Journal of Range Management. 53 (6): 562-573.

Clary, W. P. and B. F. Webster. 1990. Riparian grazing guidelines for the intermountain region. Rangelands. 12 (4): 209-212.

Clement, J. M. 2014. Proceedings of the iNEPA workshop, Clement, J. M., ed. Iterative NEPA and Collaboration, Salt Lake City, UT, University of Wyoming, 32 p.

Clements, C. D. and J. A. Young. 1997. A viewpoint: rangeland health and mule deer habitat. Journal of Range Management. 50 (2): 129-138.

Clifford, D. L., B. A. Schumaker, T. R. Stephenson, V. C. Bleich, M. L. Cahn, B. J. Gonzales, W. M. Boyce and J. A. K. Mazet. 2009. Assessing disease risk at the wildlife-livestock interface: A study of Sierra Nevada bighorn sheep. Biological Conservation. 142 (11): 2559-2568.

Clifton, C. F., K. T. Day, K. Dello, G. E. Grant, J. E. Halofsky, D. J. Isaak, C. H. Luce, M. Safeeq, B. P. Staab and J. Stevenson. 2017. Climate change and hydrology in the Blue Mountains [Chapter 3]. In: Climate change vulnerability and adaptation in the Blue Mountains. General Technical Report PNW-GTR-939, Halofsky, J. E. and D. L. Peterson, eds. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 25-52.

Clifton, C. F., K. T. Day, G. E. Grant, J. E. Halofsky, C. H. Luce and B. P. Staab. 2017. Climate Change, Water Resources, and Roads in the Blue Mountains, Chapter 4. In: Climate change vulnerability and adaptation in the Blue Mountains. General Technical Report PNW-GTR-939, Halofsky, J. E. and D. L. Peterson, eds. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 53-90.

Cline, G. G. 1988. Exploring the Great Basin. University of Nevada Press, Reno, Nevada.

Coe, J. A., J. W. Kean, J. W. Godt, R. L. Baum, E. S. Jones, D. J. Gochis and G. S. Anderson. 2014. New insights into debris-flow hazards from an extraordinary event in the Colorado Front Range. GSA Today. 24 (10): 4-10.

Coe, P. K., B. K. Johnson, J. W. Kern, S. L. Findholt, J. G. Kie and M. J. Wisdom. 2001. Responses of elk and mule deer to cattle in summer. Journal of Range Management. 54 (2): Abstract.

Coe, P. K., B. K. Johnson, K. M. Stewart and J. G. Kie. 2005. Spatial and temporal interactions of elk, mule deer, and cattle. In: The Starkey Project: a synthesis of long-term studies of elk and mule deer. Reprinted from the 2004 Transactions of the North American Wildlife and Natural Resources Conference, Wisdom, M. J., ed. Alliance Communications Group, Lawrence, Kansas. 150-158.

Coe, P. K., B. K. Johnson, M. J. Wisdom, J. G. Cook, M. Vavra and R. M. Nielson. 2011. Validation of elk resource selection models with spatially independent data. The Journal of Wildlife Management. 75 (1): 159-170.

Coggins, V. L. 2002. Rocky Mountain bighorn sheep/domestic sheep and domestic goat interactions: a management perspective, . Biennial Symposium of the Northern Wild Sheep and Goat Council 165-174.

Cole, D. 2005. Symbolic values: the overlooked values that make wilderness unique. International Journal of Wilderness. 11 (2): 12-27.

Cole, D. and P. Landres. 1995. Threats to wilderness ecosystems: impacts and research needs. Ecological Society of America. 6 (1): 168-184.

Collins, B. M., S. L. Stephens, J. J. Moghaddas and J. Battles. 2010. Challenges and approaches in planning fuel treatments across fire-excluded forested landscapes. Journal of Forestry. 108 (1): 24-41.

Collins, W. B. and P. J. Urness. 1983. Feeding behavior and habitat selection of mule deer and elk on northern Utah summer range. Journal of Wildlife Management. 47 (3): 646-663.

Connelly, J. W. and C. E. Braun. 1997. Long-term changes in sage grouse Centrocercus urophasianus populations in western North America. Wildlife Biology. 3: 229-234.

Connelly, J. W., S. T. Knick, M. A. Schroeder and S. J. Stiver. 2004. Conservation assessment of greater sage-grouse and sagebrush habitats. Unpublished report. Western Association of Fish and Wildlife Agencies, Cheyenne, Wyoming. 610 p.

Connelly, J. W., E. T. Rinkes and C. E. Braun. 2011. Characteristics of greater sage-grouse habitats: a landscape species at micro- and macroscales. In: Greater sage-grouse: ecology and conservation of a landscape species and its habitats Studies in Avian Biology Series, Knick, S. T. and J. W. Connelly, eds. University of California Press, Berkeley, CA. 69-83.

Connelly, J. W., M. A. Schroeder, A. R. Sands and C. E. Braun. 2000. Guidelines to manage sage grouse populations and their habitats. Wildlife Society Bulletin. 28 (4): 967-985.

Cook, C. W. 1977. Effects of season and intensity of use on desert vegetation. Bulletin 483. Utah Agricultural Experimental Station, Utah State University, Logan, UT. 57 p.

Cook, J. G., R. C. Cook, R. W. Davis and L. L. Irwin. 2016. Nutritional ecology of elk during summer and autumn in the Pacific Northwest. Wildlife Monographs. 195 (1): 1-81.

Cook, J. G., L. L. Irwin, L. D. Bryant, R. A. Riggs and J. W. Thomas. 2005. Thermal cover needs of large ungulates: a review of hypothesis tests In: The Starkey Project: a synthesis of long-term studies of elk and mule deer. Reprinted from the 2004 Transactions of the North American Wildlife and Natural Resources Conference, Wisdom, M. J., ed. Alliance Communications Group, Lawrence, Kansas. Pages 185-196.

Cook, J. G., B. K. Johnson, R. C. Cook, R. A. Riggs, T. DelCurto, L. D. Bryant and L. L. Irwin. 2004. Effects of summer-autumn nutrition and parturition date on reproduction and survival of elk. Wildlife Monographs. 1-61.

Cooper, D. J., J. S. Sanderson, D. I. Stannard and D. P. Groeneveld. 2006. Effects of long-term water table drawdown on evapotranspiration and vegetation in an arid region phreatophyte community. Journal of Hydrology. 325 (1-4): 21-34.

Cooper, R. M. 2002. Determining surface water availability in Oregon. Open File Report SW 02-002. State of Oregon, Water Resources Department, Salem. 170 pp.

Cooper, R. M. 2006. Estimation of peak discharges for rural, unregulated streams in eastern Oregon. Open File Report SW 06-001. State of Oregon, Water Resources Department, Salem, Oregon. 152 pp.

Cooperrider, A. Y. 2002. Elk and ecosystem management. In: North American elk: ecology and management, Toweill, D. E. and J. W. Thomas, eds. Wildlife Management Institute, Washington, D.C. 515-530 pp.

Copeland, J. P. 1996. Biology of the wolverine in central Idaho, M.S. Thesis, University of Idaho, Moscow, ID. 138 p.

Copeland, J. P., K. S. McKelvey, K. B. Aubry, A. Landa, J. Persson, R. M. Inman, J. Krebs, E. Lofroth, H. Golden, J. R. Squires, A. Magoun, M. K. Schwartz, J. Wilmot, C. L. Copeland, R. E. Yates, I. Kojola and R. May. 2010. The bioclimatic envelope of the wolverine (*Gulo gulo*): do climatic constraints limit its geographic distribution? Canadian Journal of Zoology. 88 (3): 233-246.

Copeland, J. P., J. M. Peek, C. R. Groves, W. E. Melquist, K. S. McKelvey, G. W. McDaniel, C. D. Long and C. E. Harris. 2007. Seasonal habitat associations of the wolverine in central Idaho. Journal of Wildlife Management. 71 (7): 2201-2212.

Countryman, B. 2007. Summary of the process used to calculated new historic range of variability (HRV) values for forested settings in the Blues using the VDDT model. Unpublished paper. U.S. Department of Agriculture Forest Service, Wallowa-Whitman National Forest, Blue Mountain Forest Plan Revision Team, Baker City, OR. 10 p.

Countryman, B. 2008. Assessment of changed vegetation conditions for forest plan revision in the Blues. Unpublished paper on file at: U.S. Department of Agriculture Forest Service, Wallowa-Whitman National Forest, Blue Mountain Forest Plan Revision Team, Baker City, OR. 10 p.

Countryman, B. 2008a. Comparison of CVS, GNN, and Forest Service polygon data (EVG) for the Blue Mountains forest plan revision. Unpublished paper. U.S. Department of Agriculture Forest Service, Wallowa-Whitman National Forest, Blue Mountain Forest Plan Revision Team, Baker City, OR. 6 p.

Countryman, B. 2009a. Treatment assumptions for Blue Mountains forest plan revision 2009 proposed action. Unpublished paper. U.S. Department of Agriculture Forest Service, Wallowa-Whitman National Forest, Blue Mountain Forest Plan Revision Team, Baker City, OR. 15 p.

Countryman, B. 2010. Vegetation affected environment (Draft), Blue Mountains Forest Plant Revision, Malheur, Umatilla and Wallowa-Whitman National Forests. U.S. Department of Agriculture, Forest Service, Blue Mountains Forest Plan Revision Team, Baker City, Oregon. 16 p.

Countryman, B. and D. Justice. 2009. Insect and disease hazard assessment using CVS data. 74.

Countryman, B. and D. Justice. 2010. Analysis of existing versus historic condition for structural stages and potential vegetation groups within the Malheur, Umatilla, and Wallowa-Whitman National Forests. U.S. Department of Agriculture, Forest Service, Blue Mountains Forest Plan Revision Team, Baker City, Oregon. 16 p.

Countryman, B. and D. K. Swanson. 2008. Rangeland condition and trend for the Blue Mountains forest plan revision. Revised 2010. Unpublished paper on file at: U.S. Department of Agriculture Forest Service, Wallowa-Whitman National Forest, Blue Mountain Forest Plan Revision Team, Baker City, OR. 27 p.

Covington, W. W., P. Z. Fulé, M. M. Moore, S. C. Hart, T. E. Kolb, J. N. Mast, S. S. Sackett and M. R. Wagner. 1997. Restoring ecosystem health in ponderosa pine forests of the Southwest. Journal of Forestry. 95 (4): 23-29.

Cox, G. 1999. Alien Invasion in North America and Hawaii: Impacts on Natural Ecosystems. Island Press.

Craigg, T. L. 2000. Subsoiling to restore compacted soils, Paper presented at 21st annual forest vegetation management conference, Redding, Ca, 8 p.

Craigg, T. L. and S. W. Howes. 2007. Assessing quality in volcanic ash soils, Page-Dumroese, D. M., Richard; Mital, Jim; McDaniel, Paul; Miller, Dan, ed. Volcanic-Ash-Derived Forest Soils of the Inland Northwest: Properties and Implications for Management and Restoration, Proceedings RMRS-P-44, Coeur d'Alene, ID, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO, 47-66.

Crane, M. F. and W. C. Fischer. 1986. Fire ecology of the forest habitat types of central Idaho. General Technical Report INT-218. U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Ogden, UT.

Crawford, J. A., R. A. Olson, N. E. West, J. C. Mosley, M. A. Schroeder, T. D. Whitson, R. F. Miller, M. A. Gregg and C. S. Boyd. 2004. Ecology and management of sage-grouse and sage-grouse habitat. Journal of Range Management. 57 (1): 2-19.

Croft, L. K., W. R. Owen and J. S. Shelly. 1997. Interior Columbia Basin Ecosystem Management Project Analysis of Vascular Plants. U. S. Department of Agriculture, Forest Service, Pacific Northwest Research Station,

Croke, J., S. Mockler, P. Fogarty and I. Takken. 2005. Sediment concentration changes in runoff pathways from a forest road network and the resultant spatial pattern of catchment connectivity. Geomorphology. 68 (3-4): 257-268.

Crowe, E. A. and R. R. Clausnitzer. 1997. Mid-montane wetlands classification of the Malheur, Umatilla and Wallowa-Whitman National Forests. Baker City, Oregon, 299 pp.

Crozier, L. G. and R. W. Zabel. 2006. Climate impacts at multiple scales: evidence for differential population responses in juvenile Chinook salmon. Journal of Animal Ecology. 75: 1100-1109.

Crozier, L. G., R. W. Zabel and A. F. Hamlet. 2008. Predicting differential effects of climate change at the population level with life-cycle models of spring Chinook salmon. Global Change Biology. 14: 236-249.

Cullen, S., R.V.Taylor and H. Schmalz. 2011. Do Cattle Eat Spalding's Catchfly? An Examination of Browse Rates in Grazed and Un-grazed Areas of the Zumwalt Prairie Preserve. The Nature Conservancy, Enterprise, OR.

Curran, M., P. Green and D. Maynard. 2007. Volcanic ash soils: sustainable soil management practices, with examples of harvest effects and root disease trends. In: Volcanic ash-derived soils of the inland Northwest: properties and implications for management and restoration, RMRS-P-44, Page-Dumroese, D., R. Miller, J. Mital and D. Miller, eds. U.S. Forest Service, Rocky Mountain Research Station, Fort Collins, Colorado. 97-119.

Currie, D. J. 2001. Projected effects of climate change on patterns of vertebrate and tree species richness in the conterminous United States. Ecosystems. 4 (3): 216-225.

D

Dahlgren, D. K., R. Chi and T. A. Messmer. 2006. Greater sage-grouse response to sagebrush management in Utah. Wildlife Society Bulletin. 34 (4): 975-985.

Dai, A. 2011. Drought under global warming: a review. Wiley Interdisciplinary Reviews: Climate Change. 2 (1): 45-65.

Dalke, P. D., D. B. Pyrah, C. S. Don, J. E. Crawford and E. F. Schlatterer. 1963. Ecology, productivity, and management of sage grouse in Idaho. Journal of Wildlife Management. 27 (4): 811-841.

Dalton, M. M., K. D. Dello, L. Hawkins, P. W. Mote and D. E. Rupp. 2017. The Third Oregon Climate Assessment Report. Oregon Climate Change research Institute, Oregon State University, Corvallis, OR. 98 p.

Damiran, D. 2006. Influence of previous cattle and elk grazing on the subsequent diet quality and nutrient intake rate of cattle, deer, and elk grazing late-summer mixed-conifer rangelands. Ph.D. dissertation, Oregon State University, Corvallis, OR.

Daniels, J. M. 2004. Assessing socioeconomic resiliency in Washington counties. US Department of Agriculture, Forest Service, Pacific Northwest Research Station,

Dassanayake, R. P., W. Liu, W. C. Davis, W. J. Foreyt and S. Srikumaran. 2008. Bighorn sheep {beta}2-Integrin LFA-1 serves as a receptor for *Mannheimia haemolytica leukotoxin*. Journal of Wildlife Diseases. 44 (3): 743-747.

Dassanayake, R. P., S. Shanthalingam, C. N. Herndon, P. K. Lawrence, E. Frances Cassirer, K. A. Potter, W. J. Foreyt, K. D. Clinkenbeard and S. Srikumaran. 2009. *Mannheimia haemolytica* serotype A1 exhibits differential pathogenicity in two related species, *Ovis canadensis* and *Ovis aries*. Veterinary Microbiology. 133 (4): 366-371.

Daszak, P., A. A. Cunningham and A. D. Hyatt. 2003. Infectious disease and amphibian population declines. Diversity and Distributions. 9 (2): 141-150.

Dawson, C. P. and J. C. Hendee. 2009. Wilderness Management, Stewardship and Protection of Resources and Values, Fourth Edition. Fulcrum Publishing, Golden, CO.

Day, K., T. Hickman, A. Johnson and B. Lathrop. 2015. Status and trend at PIBO stream monitoring sites on the Umatilla National Forest in the North Fork John Day River Watershed. Unpublished document. U.S. Department of Agriculture, Forest Service, Umatilla National Forest, Pendleton, OR. 35 p.

DeBano, L. F. and J. S. Krammes. 1966. Water repellent soils and their relation to wildfire temperatures. Bulletin International Association of Scientific Hydrology. 11 (2): 14-19.

DeGraaf, R. M., V. E. Scott, R. H. Hamre, L. Ernst and S. H. Anderson. 1991. Forest and rangeland birds of the United States: natural history and habitat use. U.S. Department of Agriculture, Forest Service, Washington, DC. 625 p.

DeGraaf, R. M. and M. Yamasaki. 2003. Options for managing early-successional forest and shrubland bird habitats in the northeastern United States. Forest Ecology and Management. 185 (1-2): 179-191.

DeGraff, J. V. 1994. The geomorphology of some debris flows in the southern Sierra Nevada, California. Geomorphology. 10 (1-4): 231-252.

DellaSala, D. A. and C. T. Hanson, eds. 2015. The Ecological Importance of Mixed-severity Fires: Nature's Phoenix. Elsevier,

DeLong, S. C. and D. Tanner. 1996. Managing the pattern of forest harvest: lessons from wildfire. Biodiversity & Conservation. 5 (10): 1191-1205.

Dennison, P. E., S. C. Brewer, J. D. Arnold and M. A. Moritz. 2014. Large wildfire trends in the western United States, 1984–2011. Geophysical Research Letters. 41 (8): 2928-2933.

Denoël, M. and G. F. Ficetola. 2007. Landscape-level thresholds and newt conservation. Ecological Applications. 17 (1): 302-309.

Derner, J. D. and G. E. Schuman. 2007. Carbon sequestration and rangelands: A synthesis of land management and precipitation effects. Journal of Soil and Water Conservation. 62 (2): 77-85.

Desser, R. 2006. Rationale for 80% annual effectiveness estimate in cost analysis for invasive plant projects. 2 p.

Dettinger, M. D., F. M. Ralph, T. Das, P. J. Neiman and D. R. Cayan. 2011. Atmospheric rivers, floods and the water resources of California. Water. 3 (2): 445-478.

Devine, W., C. Aubry, J. Miller, K. Potter and A. Bower. 2012. Climate change and forest trees in the Pacific Northwest: guide to vulnerability assessment methodology. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Olympia, WA. 49 p.

Dingeldein, J., R. V. Taylor, H. Schmalz and V. Jansen. 2010. Demography, Phenology and Predation of Spalding's Catchfly (*Silene spaldingii*) on the Zumwalt Prairie Preserve, 2006–2009. Final report – May 2010. The Nature Conservancy, Enterprise, OR.

DiTomaso, J. M. 2000. Invasive weeds in rangelands: species, impacts, and management. Weed Science. 48: 255-265.

Dixon, G. E. 2002. Essential FVS: A user's guide to the Forest Vegetation Simulator. U.S. Department of Agriculture, Forest Service, Forest Management Service Center, Fort Collins, CO.

Dixon, G. E. 2008. Blue Mountains (BM) variant overview—Forest vegetation simulator. U.S. Department of Agriculture, Forest Service, Forest Management Service Center, Fort Collins, CO.

Doherty, K. E., D. E. Naugle, H. Copeland, A. Pocewicz and J. Kiesecke. 2011. Energy development and conservation tradeoffs: systematic planning for sage-grouse in their eastern range In: Greater Sage-Grouse: ecology and conservation of a landscape species and its habitat, Knick, S. T. and J. W. Connelly, eds. University of California Press, Berkeley, CA. 505-516.

Donato, D. C., J. B. Fontaine, J. L. Campbell, W. D. Robinson, J. B. Kauffman and B. E. Law. 2006. Post-wildfire logging hinders regeneration and increases fire risk. Science. 311 (5759): p. 352.

Donnegan, J., S. Campbell and D. Azuma, eds. 2008. Oregon's forest resources, 2001-2005: five-year Forest Inventory and Analysis report. U.S. Forest Service, Pacific Northwest Research Station, Portland, OR. 186 p.

Douglass, A. E. 1940. Notes on the technique of tree-ring analysis, I. Tree-Ring Bulletin. 7 (1): 2-8.

Drever, C. R., G. Peterson, C. Messier, Y. Bergeron and M. Flannigan. 2006. Can forest management based on natural disturbances maintain ecological resilience? Canadian Journal of Forest Research. 36 (9): 2285-2299.

Drew, T. J. and J. W. Flewelling. 1977. Some recent Japanese theories of yield-density relationships and their application to Monterey pine plantations. Forest Science. 23 (4): 517-534.

Drew, T. J. and J. W. Flewelling. 1979. Stand density management: an alternative approach and its application to Douglas-fir plantations. Forest Science. 25 (3): 518-532.

Drews, E. S., B. R. Hatsough, J. A. Doyal and L. D. Kellogg. 2001. Harvester forwarder and harvester-yarder system for fuel reduction treatments. Journal of Forest Engineering. 12 (1): 81-91.

Dukes, J. S. and H. A. Mooney. 1999. Does global change increase the success of biological invaders? Trends in Ecology and Evolution. 14: 135-139.

Dunaway, D., S. R. Swanson, J. Wendel and W. Clary. 1994. The effect of herbaceous vegetation and soil texture on particle erosion of alluvial streambanks. Geomorphology. 9 (1): 47-57.

Duncan, S. H. and J. W. Ward. 1985. The influence of watershed geology and forest roads on the composition of salmon spawning gravel. Northwest Science. 59 (3): 204-212.

Dunne, T. and R. D. Black. 1970. Partial area contribution to storm runoff in a small New England watershed. Water Resources Research. 6 (5): 1296-1311.

Dwire, K. A. 2017. Climate change and special habitats in the Blue Mountains: Riparian areas, wetlands, and groundwater-dependent ecosystems [Chapter 7]. In: Climate change vulnerability and adaptation in the Blue Mountains, General Technical Report PNW-939, Halofsky, J. E. and D. L. Peterson, eds. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 252-323.

Dwire, K. A. and J. B. Kauffman. 2003. Fire and riparian ecosystems in landscapes of the western USA. Forest Ecology and Management. 178 (1-2): 61-74.

Dwire, K. A., C. C. Rhoades and M. K. Young. 2010. Potential effects of fuel management activities on riparian areas. In: Cumulative watershed effects of fuel management in the western United States, General Technical Report RMRS-GTR-231, Elliott, W. J., I. S. Miller and L. Audin, eds. U.S. Department of Agriculture Forest Service, Rocky Mountain Research Station, Fort Collins, Colorado. 175-205.

Dymond, C. C., S. Tedder, D. L. Spittlehouse, B. Raymer, K. Hopkins, K. McCallion and J. Sandland. 2014. Diversifying managed forests to increase resilience. Canadian Journal of Forest Research. 44 (10): 1196-1205.

E

Eagles-Smith, C. A., G. Herring, B. L. Johnson and R. Graw. 2013. Mercury bioaccumulation in fishes from subalpine lakes in the Wallowa-Whitman National Forest, northeastern Oregon and western Idaho. Open-File Report 2013-1148. U.S. Geological Survey, Reston, VA. 38 p.

Eckberg, T. 1994. Primary focus trees for the mountain pine beetle in the Black Hills. Research Note RM-RN-531. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO. 11p.

Eckstein, R. G., T. F. O'Brien, O. J. Rongstad and J. G. Bollinger. 1979. Snowmobile effects on movements of white-tailed deer: A case-study. Environmental Conservation. 6 (01): 45-51.

Edelmann, F. and J. Copeland. 1999. Wolverine distribution in the northwestern United States and a survey in the Seven Devils Mountains of Idaho. Northwest Science. 73: 295-300.

Edge, W. D. and C. L. Marcum. 1991. Topography ameliorates the effects of roads and human disturbance on elk. In: Proceedings for symposium on elk vulnerability, Christensen, A. G., L. J. Lyon and T. N. Lonner, eds. Montana State University, Bozeman, MT. 132-137.

Egan, D. 2007. Conserving and restoring old growth in frequent-fire forests: cycles of disruption and recovery. Ecology and Society. 12 (2): http://www.ecologyandsociety.org/vol12/iss2/art23/.

Egan, D. and E. A. Howell, eds. 2001. The historical ecology handbook, a restorationist's guide to reference ecosystems. Island Press, Washington, D.C. 469 p.

Eidenshink, J., B. Schwind, K. Brewer, Z.-L. Zhu, B. Quayle and S. Howard. 2007. A project for monitoring trends in burn severity. Fire Ecology. 3 (1): 3-21.

Eilers, J. M., T. Samman and M. S. V. Douglas. 2000. A limnological reconnaissance of selected Eagle Cap Wilderness Lakes and paleolimnological assessment of Mirror Lake. Report prepared for the USDA Forest Service, Pacific Northwest Region. E&S Environmental Chemistry, Inc., Corvallis, OR.

Elliot, W. J., I. S. Miller and L. Audin, eds. 2010. Cumulative watershed effects of fuel management in the western United States, General Technical Report RMRS-GTR-231. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, Colorado. 299 p.

Elmore, W. 1992. Riparian responses to grazing practices. In: Watershed management, balancing sustainability and environmental change, Naiman, R., ed. Springer-Verlag, New York. 442-457.

Elsner, M. M., L. Cuo, N. Voisin, J. Deems, A. F. Hamlet, J. A. Van, K. E. B. Mickelson, S. Y. Lee and D. P. Lettenmaier. 2010. Implications of 21st century climate change for the hydrology of Washington State. Climatic Change. 102 (1-2): 225-260.

Erickson, H. E. and R. White. 2008. Soils under fire: soils research and the Joint Fire Science Program. General Technical Report PNW-GTR-759. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 17 p.

ESSA Technologies Ltd. 2007. Vegetation dynamics development tool user guide, version 6.0. ESSA Technologies Ltd., Vancouver, BC.

Everest, F. H. and G. H. Reeves. 2007. Riparian and aquatic habitats of the Pacific Northwest and southeast Alaska: ecology, management history, and potential management strategies. General Technical Report PNW-GTR-692. USDA Forest Service, Pacific Northwest Research Station, Portland, Oregon. 130 p.

Everett, R. L. 1994. Eastside forest ecosystem health assessment, volume IV: restoration of stressed sites and processes. PNW-GTR-330. U. S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 123 p.

Everitt, B. L. 1968. Use of the cottonwood in an investigation of recent history of a floodplain. American Journal of Science. 266 (6): 417-439.

F

Fahrig, L. and G. Merriam. 1985. Habitat patch connectivity and population survival. Ecology. 66 (6): 1762-1768.

Farley, K. A., E. G. Jobbágy and R. B. Jackson. 2005. Effects of afforestation on water yield: a global synthesis with implications for policy. Global Change Biology. 11 (10): 1565-1576.

Farnell. 1979. Grande Ronde River navigability study. Oregon Division of State Lands, Salem, OR. 38 p.

Farren, E. C. 2006a. Harvest and road forest plan monitoring for the South zone, Umatilla National Forest. Unpublished paper on file at: USDA Forest Service, Umatilla National Forest, North Fork John Day Ranger District. Ukiah, OR.

Farren, E. C. 2006b. Owens fuels trial soil monitoring results, Umatilla National Forest. Unpublished paper on file at: USDA Forest Service, Umatilla National Forest, North Fork John Day Ranger District. Ukiah, OR.

Ferguson, S. A. 1999. Climatology of the Interior Columbia River Basin. General Technical Report PNW-GTR-445. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, Oregon. 31 p.

Ferns, M. L. and D. F. Huber. 1984. Mineral resources map of Oregon, GMS-36. Oregon Department of Geology and Mineral Industries, Salem, OR. 1:500,000 scale map of mineralized areas in Oregon. .

Ferns, M. L., V. S. McConnell, I. P. Madin and J. A. Johnson. 2010. Geology of the upper Grande Ronde River basin, Union County, Oregon. Bulletin B-107. Oregon Department of Geology and Mineral Industries, Salem. 65 p., 1 pl. scale 1:100,000.

Fettig, C. J., K. D. Klepzig, R. F. Billings, A. S. Munson, T. E. Nebeker, J. F. Negrón and J. T. Nowak. 2007. The effectiveness of vegetation management practices for prevention and control of bark beetle infestations in coniferous forests of the western and southern United States. Forest Ecology and Management. 238 (1): 24-53.

Fiedler, C. E., C. E. Keegan, III, C. W. Woodall and T. A. Morgan. 2004. A strategic assessment of crown fire hazard in Montana: potential effectiveness and costs of hazard reduction treatments. General Technical Report PNW-GTR-622. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 48 p.

Filip, G. M., S. A. Fitzgerald, K. L. Chadwick and T. A. Max. 2009. Thinning Ponderosa pine affected by Armillaria root disease: 40 Years of growth and mortality on an infected site in central Oregon. Western Journal of Applied Forestry. 24 (2): 88-94.

Filip, G. M. and C. L. Schmitt. 1990. Rx for Abies: silvicultural options for diseased firs in Oregon and Washington. General Technical Report PNW-GTR-252. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 34p.

Finch, D. M., J. L. Ganey, W. Yong, R. T. Kimball and R. Sallabanks. 1997. Effects and interactions of fire, logging and grazing. In: Songbird ecology in southwestern ponderosa pine forests: a literature review, Block, W. M. and D. M. Finch, eds. U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 103-136.

Findholt, S. L., B. K. Johnson, D. Damiran, T. DelCurto and J. G. Kie. 2004. Diet composition, dry matter intake, and diet overlap of mule deer, elk, and cattle. Transactions of the North American Wildlife and Natural Resource Conference 69. 670-686.

Finney, M. A. 2001. Design of regular landscape fuel treatment patterns for modifying fire growth and behavior Forest Science. 47: 219-228.

Finney, M. A., R. C. Seli, C. W. McHugh, A. A. Ager, B. Bahro and J. K. Agee. 2006. Simulation of long-term landscape-level fuel treatment effects on large wildfires. International Journal of Wildland Fire. 16 (6): 712-727.

Fischlin, A., G. F. Midgley, J. T. Price, R. Leemans, B. Gopal, C. Turley, M. D. A. Rounsevell, O. P. Dube, J. Tarazona and A. A. Velichko. 2007. Ecosystems, their properties, goods, and services. In: Climate Change 2007: Impacts, Adaptation and Vulnerability, Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Parry, M. L., O. F. Canziani, J. P. Palutikof, P. J. v. d. Linden and C. E. Hanson, eds. Cambridge University Press, Cambridge, UK. 211-272.

Fleischner, T. L. 1994. Ecological costs of livestock grazing in western North America. Conservation Biology. 8 (3): 629-644.

Fondell, T. F. and I. J. Ball. 2004. Density and success of bird nests relative to grazing on western Montana grasslands. Biological Conservation. 117 (2): 203-213.

Fontaine, J. B., D. C. Donato, W. D. Robinson, B. E. Law and J. B. Kauffman. 2009. Bird communities following high-severity fire: Response to single and repeat fires in a mixed-evergreen forest, Oregon, USA. Forest Ecology and Management. 257 (6): 1496-1504.

Ford, M. 2010. Status review update for Pacific salmon and steelhead listed under the Endangered Species Act: Northwest, NOAA Technical Memorandum NOAA-TM-NWFSC-XXX. Cooney, T., P. McElhaney, N. Sands, L. Weitcamp, J. Hard, M. McClure, R. Kope, J. Myers, A. Albaugh, K. Barnas, D. Teel, P. Moran and J. Cowen. U.S. Department of Commerce, 346 p.

Ford, M. J., ed. 2011. Status review update for Pacific salmon and steelhead listed under the Endangered Species Act: Pacific Northwest, NOAA Technical Memorandum NMFS-NWFSC-113. U.S. Department of Commerce, National Marine Fisheries Service, Northwest Fisheries Science Center, Seattle, WA. 281 p.

Ford, M. J., K. Barnas, T. Cooney, L. G. Crozier, M. Diaz, J. J. Hard, E. E. Holmes, D. M. Holzer, R. G. Kope, P. W. Lawson, M. Liermann, J. M. Myers, M. Rowse, D. J. Teel, D. M. Van Doornik, T. C. Wainwright, L. A. Weitkamp and M. Williams. 2015. Status review update for Pacific salmon and steelhead listed under the Endangered Species Act. National Marine Fisheries Service, Northwest Fisheries Science Center, Seattle, WA.

Forest Ecosystem Management Team [FEMAT]. 1993. Forest ecosystem management: an ecological, economic, and social assessment. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region; U.S. Department of Interior, Fish and Wildlife Service; U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service; U.S. Department of Interior, Bureau of Land Management; U.S. Department of Interior, National Park Service; U.S. Environmental Protection Agency, Portland, OR. 1039 p.

Foreyt, W. 1998. Evaluation of a multivalent *Pasteurella haemolytica* toxoid-bacterin in protecting bighorn sheep from pneumonia after exposure to domestic sheep, Whitefish, MT, 18-27.

Foreyt, W., K. Snipes and R. Kasten. 1994. Fatal pneumonia following inoculation of healthy bighorn sheep with *Pasteurella haemolytica* from healthy domestic sheep. Journal of Wildlife Diseases. 30 (2): 137-145.

Forman, R. T. T. 1995. Land mosaics: The ecology of landscapes and regions. Cambridge University Press, Cambridge, UK.

Forman, R. T. T. 2000. Estimate of the area affected ecologically by the road system in the United States. Conservation Biology. 14 (1): 31-35.

Forman, R. T. T. and M. Godron. 1981. Patches and structural components for a landscape ecology. BioScience. 31 (10): 733-740.

Foth, H. D. 1978. Fundamentals of Soil Science. John Wiley & Sons,

Fowler, P. 2010 (18 December). [email to Duke Klein, Blue Mountains Forest Plan Revision Team biologist regarding Washington population data for elk] 1 p. On file with: Blue Mountain Forest Plan Revision, Wallowa Whitman National Forest, Baker City, OR 97814. Washington Department of Fish and Wildlife, Walla Walla, WA.

Fowler, P. E. 2001. Washington State elk herd plan- Blue Mountains elk herd. Washington Department of Fish and Wildlife, Olympia, WA. 47 p.

Frair, J. L., E. H. Merrill, H. L. Beyer and J. M. Morales. 2008. Thresholds in landscape connectivity and mortality risks in response to growing road networks. Journal of Applied Ecology. 45 (5): 1504-1513.

Franklin, J. F. 1990. Biological legacies: a critical management concept from Mount St. Helens, Transactions 55th North American Wildlands Natural Resource Conference, 216-219.

Franklin, J. F., R. K. Hagmann and L. S. Urgenson. 2014. Interactions between societal goals and restoration of dry forest landscapes in western North America. Landscape Ecology. 29 (10): 1645-1655.

Franklin, J. F., M. A. Hemstrom, R. V. Pelt, J. B. Buchanan and S. Hull. 2008. The case for active management of dry forest types in eastern Washington: perpetuating and creating old forest structures and functions. Washington State Department of Natural Resources, Olympia, Washington. 97 pp.

Franklin, J. F. and K. N. Johnson. 2012. A restoration framework for federal forests in the Pacific Northwest Journal of Forestry. 110 (8): 429-439.

Franklin, J. F., K. N. Johnson, D. J. Churchill, K. Hagmann, D. Johnson and J. Johnston. 2013. Restoration of dry forests in eastern Oregon: A field guide. The Nature Conservancy, Portland, OR. 202 p.

Franklin, J. F., R. J. Mitchell and B. J. Palik. 2007. Natural disturbance and stand development principles for ecological forestry. General Technical Report NRS-GTR-19. U.S. Department of Agriculture, Forest Service, Northern Research Station, Newtown Square, PA.

Franklin, J. F., D. A. Perry, T. D. Schowalter and M. E. Harmon. 1989. Maintaining the long-term productivity of Pacific Northwest forest ecosystems. Timber Press, Portland, Oregon.

Freeze, R. A. 1974. Streamflow generation. Reviews of Geophysics and Space Physics. 12 (4): 627-647.

Frest, T. J. and E. J. Johannnes. 1995. Interior Columbia Basin mollusk species of special concern. Final Report, Contract #43-0E00-4-9112, Report prepared by Deixis Consultants, Seattle, WA for Interior Columbia Basin Ecosystem Management Project. Walla Walla, WA. 274 p. + appendices.

Friedli, H. R., L. F. Radke, R. Prescott, P. V. Hobbs and P. Sinha. 2003. Mercury emissions from the August 2001 wildfires in Washington State and an agricultural waste fire in Oregon and atmospheric mercury budget estimates. Global Biogeochemical Cycles. 17 (1039): doi:10.1029/2002GB001972.

Friedmann, H. 1963. Host relations of the parasitic cowbirds. U.S. National Museum Bulletin. 233: 5 p.

Froehlich, H. A. 1981. Compaction of forest soils. PNW 217. A Pacific Northwest Extension Publication. Corvallis, OR. 13 p.

Fulé, P. Z. 2008. Does it make sense to restore wildland fire in changing climate? Restoration Ecology. 16 (4): 526-531.

Fulé, P. Z., W. W. Covington, M. T. Stoddard and D. Bertolette. 2006. "Minimal-impact" restoration treatments have limited effects on forest structure and fuels at Grand Canyon, USA. Restoration Ecology. 14 (3): 357-368.

Furniss, M. J., T. S. Ledwith, M. A. Love, B. C. McFadin and S. A. Flanagan. 1998. Response of road-stream crossings to large flood events in Washington, Oregon, and northern California. USDA Forest Service, San Dimas Technology and Development Center, San Dimas, California. 14 pp.

Furniss, M. J., T. D. Roelofs and C. S. Yee. 1991. Road construction and maintenance. In: Influence of Forest and Rangeland management on Salmonid Fishes and Their Habitats, Meehan, W. R., ed. American Fisheries Society, Bethesda, Maryland. 297-323.

Furniss, M. M. and S. J. Kegley. 2014. Douglas-fir beetle. Forest Insect & Disease Leaflet #5. Portland, OR, 12.

G

Gaines, W. L., R. J. Harrod, J. Dickinson, A. L. Lyons and K. Halupka. 2010. Integration of Northern spotted owl habitat and fuels treatments in the eastern Cascades, Washington, USA. Forest Ecology and Management. 260 (11): 2045-2052.

Gaines, W. L., D. W. Peterson, C. A. Thomas and R. J. Harrod. 2012. Adaptations to climate change: Colville and Okanogan-Wenatchee National Forests. General Technical Report PNW-GTR-862. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 34 p.

Gaines, W. L., P. H. Singleton and R. C. Ross. 2003. Assessing the cumulative effects of linear recreation routes on wildlife habitats on the Okanogan and Wenatchee National Forests. General Technical Report PNW-GTR-586. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 79 p.

Gaines, W. L., B. C. Wales, L. H. Suring, J. S. Begley, K. Mellen-McLean and S. Mohoric. 2017. Terrestrial species viability assessments for national forests in northeastern Washington. General Technical Report PNW-GTR-907. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 324 p.

Gale, C. B., C. E. Keegan, III, E. C. Berg, J. Daniels, G. A. Christensen, C. B. Sorenson, T. A. Morgan and P. Polzin. 2012. Oregon's forest products industry and timber harvest, 2008: industry trends and impacts of the Great Recession through 2010. General Technical Report PNW-GTR-868. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 55 p.

Ganey, J. L. and S. C. Vojta. 2005. Changes in snag populations in northern Arizona mixed-conifer and ponderosa pine forests, 1997–2002. Forest Science. 51 (5): 396-405.

Garde, E., S. Kutz, H. Schwantje and A. Veitch. 2005. Examining the risk of disease transmission between wild Dall's sheep and mountain goats, and introduced domestic sheep, goats and llamas in the Northwest Territories. The Northwest Territories Agricultural Policy Framework, Environment and Natural Resources, Government of the Northwest Territories, Canada.

Garrett, K. L., M. G. Raphael and R. D. Dixon. 1996. White-headed woodpecker (*Picoides albolarvatus*), The Birds of North America Online (A. Poole, Ed.). Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/252. Cornell Lab of Ornithology, Ithaca, NY,

Gecy, R. 2009 (revised 2010). Twentieth century climate trends and potential effects of climate change on National Forest System lands in the Blue Mountains, northeast Oregon and southeast Washington. unpublished. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Blue Mountains Forest Plan Revision Team, Baker City, OR.

Gecy, R. 2013a. Watershed condition model for the Blue Mountains Forest Plan revision. U.S. Department of Agriculture, Forest Service, Blue Mountains Forest Plan Revision Team, Baker City, OR.

Gecy, R. A. 2010. A preliminary assessment of wind energy development potential and suitability on National Forest System lands in the Blue Mountains, Oregon and Washington. U.S. Department of Agriculture, Forest Service, Blue Mountains Forest Plan Revision Team, Baker City, OR. 13 p.

Gedalof, Z., D. L. Peterson and N. J. Mantua. 2005. Atmospheric, climatic, and ecological controls on extreme wildfire years in the northwestern United States. Ecological Applications. 15 (1): 154-174.

Geiser, L. H., A. R. Ingersoll, A. Bytnerowicz and S. A. Copeland. 2008. Evidence of enhanced atmospheric ammoniacal nitrogen in Hells Canyon National Recreation Area: Implications for natural and cultural resources. Journal of the Air & Waste Management Association. 58 (9): 1223-1234.

Geldenhuys, C. J. 2010. Managing forest complexity through application of disturbance–recovery knowledge in development of silvicultural systems and ecological rehabilitation in natural forest systems in Africa. Journal of Forest Research. 15 (1): 3-13.

Germaine, S. S., H. L. Germaine and S. R. Boe. 2004. Characteristics of mule deer day-bed and forage sites in current-condition and restoration-treated ponderosa pine forest. Wildlife Society Bulletin. 32 (2): 554-564.

Gibbon, J. W., D. E. Scott, T. J. Ryan, K. A. Buhlmann, T. D. Tuberville, B. S. Metts, J. L. Greene, T. Mills, Y. Leiden, S. Poppy and C. T. Winne. 2000. The global decline of reptiles, déjà vu amphibians. BioScience. 50 (8): 653-666.

Gibbs, J. P. 2000. Monitoring populations. In: Research Techniques in Animal Ecology: controversies and consequences, Boitani, L. and T. K. Fuller, eds. Columbia University Press, New York and Chichester, West Sussex. 213-252.

Gibbs, J. P., S. Droege and P. Eagle. 1998. Monitoring populations of plants and animals. BioScience. 48 (11): 935-940.

Gibson, K., S. Kegley and B. Bentz. 2009. Mountain pine beetle. Forest Insect and Disease Leaflet 2. U.S. Department of Agriculture, Forest Service. 12 p.

Gifford, G. F. and R. H. Hawkins. 1976. Grazing systems and watershed management: a look at the record. Journal of Soil and Water Conservation. 31: 281-283.

Goguen, C. B. and N. E. Mathews. 1998. Songbird community composition and nesting success in grazed and ungrazed pinyon-juniper woodlands. Journal of Wildlife Management. 62 (2): 474-484.

Goheen, D. and E. M. Hansen. 1993. Effects of pathogens and bark beetles on forests. In: Beetle-Pathogen Interactions in Conifer Forests, Schowalter, T. D. and G. M. Filip, eds. Academic Press, London. 175-196.

Goheen, E. M. and E. A. Willhite. 2006. Field guide to the common diseases and insect pests of Oregon and Washington conifers. R6-NR-FID-PR-01-06. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Portland, OR. 327 p.

Goldberg, L. 2010. The impacts of winter recreation and snowmobiles on wolverines. The Road-RIPorter. 18-20.

Goldstein, M., T. E. Lacher, B. Woodbridge, M. J. Bechard, S. B. Canavelli, M. E. Zaccagnini, G. P. Cobb, E. J. Scollon, R. Tribolet and M. J. Hopper. 1999. Monocrotophos-induced mass mortality of Swainson's hawks in Argentina, 1995–96. Ecotoxicology. 8 (3): 201-214.

Gonthier, J. B. 1985. A description of aquifer units in eastern Oregon. Water Resources Investigations Report 84-4095. U.S. Geological Survey, Portland, OR. 39 pp.

Goodell, B. C. 1967. Watershed treatment effects on evapotranspiration, Sopper, W. E. and H. W. Lull, eds. Forest Hydrology, Proceedings of a National Science Foundation Advanced Science Seminar, University Park, Pennsylvania, Pergamon Press, 477-482.

Goodrich, J. M. and J. Berger. 1994. Winter recreation and hibernating black bears Ursus americanus. Biological Conservation. 67 (2): 105-110.

Gorte, R. W. 2011. Wilderness laws: statutory provisions and prohibited and permitted uses. CRS Report for Congress, Prepared for Members and Committees of Congress. Congressional Research Service, Washington, D.C.

Graf, W. L. 1977. The rate law in fluvial geomorphology. American Journal of Science. 277 (2): 178-191.

Graham, R. T., A. E. Harvey, M. F.Jurgensen, T. B. Jain, J. R. Tonn and D. S. Page-Dumroese. 1994. Managing coarse woody debris in forests of the Rocky Mountains. General Technical Report INT-GTR-28. U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Ogden, UT. 28-50.

Graham, R. T., A. E. Harvey, T. B. Jain and J. R. Tonn. 1999. The effects of thinning and similar stand treatments on fire behavior in Western forests. General Technical Report PNW-GTR-463. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 27 p.

Graham, R. T., S. McCaffrey and T. B. Jain, eds. 2004. Science basis for changing forest structure to modify wildfire behavior and severity, General Technical Report, RMRS-GTR-120. USDA Forest Service, Rocky Mountain Research Station, Fort Collins, Colorado. 43 pp.

Grant, G. E., S. L. Lewis, F. J. Swanson, J. H. Cissel and J. J. McDonnell. 2008. Effects of forest practices on peak flows and consequent channel response: A state-of-science report for western Oregon and Washington. General Technical Report PNW-GTR-760. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 76 pp.

Grant, G. E., F. J. Swanson and M. G. Wolman. 1990. Pattern and origin of stepped-bed morphology in high-gradient streams, western Cascades, Oregon. Geological Society of America Bulletin. 102 (3): 340-352.

Gregory, S. V., G. A. Lamberti and K. M. S. Moore. 1989. Influence of valley floor landforms on stream ecosystems. In: Proceedings of the California Riparian Systems Conference, General Technical Report GTR-PSW-110, Abell, D. L., ed. USDA Forest Service, Pacific Southwest Forest and Range Experiment Station, Davis, California. 3-8.

Gregory, S. V., F. J. Swanson, W. A. McKee and K. W. Cummins. 1991. An ecosystem perspective of riparian zones. BioScience. 41 (8): 540-551.

Grier, C. G. and S. W. Running. 1977. Leaf area of mature northwestern coniferous forests: relation to site water balance. Ecology. 58 (4): 893-899.

Gross, J. E., F. J. Singer and M. E. Moses. 2000. Effects of disease, dispersal, and area on bighorn sheep restoration. Restoration Ecology. 8 (4S): 25-37.

Gruell, G. E. 1985. Fire on the early western landscape: an annotated record of wildland fires 1776-1900. Northwest Science. 59 (2): 97-105.

Gu, W. and R. K. Swihart. 2004. Absent or undetected? Effects of non-detection of species occurrence on wildlife-habitat models. Biological Conservation. 116 (2): 195-203.

Guan, B., N. P. Molotch, D. E. Waliser, E. J. Fetzer and P. J. Neiman. 2010. Extreme snowfall events linked to atmospheric rivers and surface air temperature via satellite measurements. Geophysical Research Letters. 37 (L20401): doi:10.1029/2010GL044696.

Guan, B., D. E. Waliser, F. M. Ralph, E. J. Fetzer and P. J. Neiman. 2016. Hydrometeorological characteristics of rain-on-snow events associated with atmospheric rivers. Geophysical Research Letters. DOI: 10.1002/2016GL067978

Gurnell, A. M. 1998. The hydrogeomorphological effects of beaver dam-building activity. Progress in Physical Geography. 22 (2): 167-189.

H

Haak, A. L., J. E. Williams, D. Isaak, A. Todd, C. C. Muhlfeld, J. L. Kershner, R. E. Gresswell, S. W. Hostetler and H. M. Neville. 2010. The potential influence of changing climate on the persistence of salmonids of the inland west. U.S. Geological Survey Open-File Report 2010–1236. Reston, Virginia. 74 p.

Hagen, C. A. 2011. Greater sage-grouse conservation assessment and strategy for Oregon: a plan to maintain and enhance populations and habitat. Oregon Department of Fish and Wildlife, Salem, OR. 221 p.

Hagen, C. A., J. W. Connelly and M. A. Schroeder. 2007. A meta-analysis of greater sage-grouse *Centrocercus urophasianus* nesting and brood-rearing habitats. Wildlife Biology. 13 (sp1): 42-50.

Haggard, M. and W. L. Gaines. 2001. Effects of stand-replacement fire and salvage logging on a cavity-nesting bird community in eastern Cascades, Washington. Northwest Science. 75 (4): 387-396.

Hahn, T. P. 1996. Cassin's finch (*Carpodacus cassinii*), The Birds of North America Online (A. Poole, Ed.). Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/240. Cornell Lab of Ornithology, Ithaca, NY,

Hall, F. C. 1973. Plant communities of the Blue Mountains in eastern Oregon and southeastern Washington. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Portland, OR. 62 p.

Hall, F. C. 1977. Ecology of natural underburning in the Blue Mountains of Oregon. R6-Ecol-79-001. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Portland, OR.

Halofsky, J. E. and D. E. Hibbs. 2008. Determinants of riparian fire severity in two Oregon fires, USA. Canadian Journal of Forest Research. 38 (7): 1959-1973.

Halofsky, J. E. and D. E. Peterson, eds. 2017. Climate Change Vulnerability and Adaptation in the Blue Mountains Region, General Technical Report PNW-GTR-939. U.S. Forest Service, Pacific Northwest Research Station, Portland, OR. 331 p.

Halofsky, J. E., D. L. Peterson, K. A. O'Halloran and C. Hawkins Hoffman. 2011. Adapting to climate change at Olympic National Forest and Olympic National Park. General Technical Report PNW-GTR-844. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 130 p.

Halstead, L. E., L. D. Howery, G. B. Ruyle, P. R. Krausman and R. J. Steidl. 2002. Elk and cattle forage use under a specialized grazing system. Journal of Range Management. 55 (4): 360-366.

Hamann, B., H. Johnston, P. McClelland, S. Johnson, L. Kelly and J. Gobielle. 1999. Chapter 3 Birds. In: Effects of recreation on Rocky Mountain wildlife: A Review for Montana, Joslin, G. and H. Youmans, eds. Committee on Effects of Recreation on Wildlife, Montana Chapter of The Wildlife Society, 3.1-3.34.

Hamlet, A. F., P. Carrasco, J. Deems, M. M. Elsner, T. Kamstra, C. Lee, S.-Y. Lee, G. S. Mauger, E. P. Salathé, I. Tohver and L. W. Binder. 2010. Final report for the Columbia basin climate change scenarios project. Climate Impacts Group, University of Washington, Seattle.

Hamlet, A. F., M. M. Elsner, G. S. Mauger, S.-Y. Lee, I. Tohver and R. A. Norheim. 2013. An overview of the Columbia Basin climate change scenarios project: Approach, methods, and summary of key results. Atmosphere-Ocean. 51 (4): 392-415.

Hamlet, A. F., M. M. Elsner and K. Unger. 2010. Update on the Columbia Basin Climate Change Scenarios Project. Available online at: http://cses.washington.edu/cig/outreach/workshopfiles/vancouver2010/hamlet2860.pdf, last accessed June 26, 2011. CSES Climate Impacts Group, Department of Civil & Environmental Engineering, University of Washington and Washington Department of Ecology, Seattle, WA.

Hamlet, A. F. and D. P. Lettenmaier. 2007. Effects of 20th century warming and climate variability on flood risk in the western U.S. Water Resources Research. 43 (W06427): doi:10.1029/2006WR005099.

Hamlet, A. F., P. W. Mote, M. Clark and D. P. Lettenmaier. 2005. Effects of temperature and precipitation variability on snowpack trends in the western United States. Journal of Climate. 18 (21): 4545-4561.

Hammer, T. R. 1972. Stream channel enlargement due to urbanization. Water Resources Research. 8 (6): 1530-1540.

Hampton, E. R. and S. G. Brown. 1964. Geology and ground-water resources of upper Grande Ronde River Basin, Union County, Oregon. Water Supply Paper 1597. U.S. Geological Survey, Washington, D. C. 99 p.

Han, H. S. 2007. Economics of soil disturbance, Page-Dumroese, D., R. Miller, J. Mital, P. McDaniel and D. Miller, eds. Volcanic-ash-derived forest soils of the Inland Northwest: properties and implications for management and restoration, Proceedings RMRS-P-44, Coeur d'Alene, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO, 165-171.

Han, S. K. 2006. Impacts on soils from cut-to-length and whole tree harvesting. M.S. thesis, University of Idaho, Moscow, ID.

Hann, W., A. Shlisky, D. Havlina, K. Schon, S. Barrett, T. DeMeo, K. Pohl, J. Menakis, D. Hamilton, J. Jones, M. Levesque and C. Frame. 2004. Interagency Fire Regime Condition Class Guidebook. Last update September: Version 3.0. Homepage of the Interagency and The Nature Conservancy fire regime condition class website, available at: http://www.fire.org/niftt/released/FRCC_Guidebook_2010_final.pdf. U.S. Department of Agriculture, Forest Service, U.S. Department of the Interior, The Nature Conservancy, and Systems for Environmental Management,

Hann, W. J., J. L. Jones, M. G. Karl, P. F. Hessburg, R. E. Keane, D. G. Long, J. P. Menakis, C. H. McNicoll, S. G. Leonard, R. A. Gravenmier and B. G. Smith. 1997. Landscape dynamics of the basin, Chapter 3. In: An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins, General Technical Report PNW-GTR-405, Volume 2, Quigley, T. M. and S. J. Arbelbide, eds. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 363-960.

Hann, W. J., M. J. Wisdom and M. M. Rowland. 2003. Disturbance departure and fragmentation of natural systems in the Interior Columbia Basin. Quigley, T. M. Research Paper PNW-RP-545. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

Hanna, P. and D. Kulakowski. 2012. The influences of climate on aspen dieback. Forest Ecology and Management. 274: 91-98.

Hanski, I. and M. Gilpin, eds. 1997. Metapopulation biology; ecology, genetics, and evolution. Academic Press, San Diego, California.

Hanski, I., A. Moilanen and M. Gyllenberg. 1996. Minimum viable metapopulation size. American naturalist. 147 (4): 527-541.

Hanson, C. T., D. C. Odion, D. A. Dellasala and W. L. Baker. 2009. Overestimation of fire risk in the Northern Spotted Owl recovery plan. Conservation Biology. 23: 1314-1319.

Hardy, C. C. 2005. Wildland fire hazard and risk: Problems, definitions, and context Forest Ecology and Management. 211 (1-2): 73-82.

Harr, R. D. 1977. Water flux in soil and subsoil on a steep forested slope. Journal of Hydrology. 33 (1-2): 37-58.

Harris, R., J. Gerstein and P. H. Cafferata. 2008. Changes in stream channel morphology caused by replacing road-stream crossings on timber harvesting plans in northwestern California. Western Journal of Applied Forestry. 23 (2): 69-77.

Harris, R. M., C. F. Clifton and S. M. Wondzell. 2007. Hillslope erosion rates in areas with volcanic parent materials and the effects of prescribed fires in the Blue Mountains of eastern Oregon and Washington, USA, Furniss, M., C. Clifton and K. Ronnenberg, eds. Advancing the fundamental sciences: Proceedings of the Forest Service national earth sciences conference, General Technical Report PNW-GTR-689, San Diego, CA, U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 7-19.

Harrod, R. J., W. L. Gaines, W. E. Hartl and A. Camp. 1998. Estimating historical snag density in dry forests east of the Cascade Range. General Technical Report PNW-GTR-428. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 16 p.

Harrod, R. J., D. W. Peterson, N. A. Povak and E. K. Dodson. 2009. Thinning and prescribed fire effects on overstory tree and snag structure in dry coniferous forests of the interior Pacific Northwest. Forest Ecology and Management. 258 (5): 712-721.

Hart, R. H., S. Clapp and P. S. Test. 1993. Grazing strategies, stocking rates, and frequency and intensity of grazing on western wheatgrass and blue grama. Journal of Range Management. 46 (2): 122-126.

Hart, R. H., M. J. Samuel, J. W. Waggoner and M. A. Smith. 1989. Comparisons of grazing systems in Wyoming. Journal of Soil and Water Conservation. 44 (4): 344-347.

Harvey, A. E., M. F. Jurgensen, M. J. Larsen and R. T. Graham. 1987. Decaying organic materials and soil quality in the Inland Northwest: A management opportunity. General Technical Report INT-GTR-225. U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Ogden, UT. 15 p.

Haufler, J. B., C. A. Mehl and G. J. Roloff. 1996. Using a coarse filter approach with a species assessment for ecosystem management. Wildlife Society Bulletin. 24 (2): 200-208.

Haugo, R., C. Zanger, T. DeMeo, C. Ringo, A. Shlisky, K. Blankenship, M. Simpson, K. Mellen-McLean, J. Kertis and M. Stern. 2015. A new approach to evaluate forest structure restoration needs across Oregon and Washington, USA. Forest Ecology and Management. 335: 37-50.

Haupt, H. F. and J. W. Kidd. 1965. Good logging practices reduce sedimentation in central Idaho. Journal of Forestry. 63 (9): 664-670.

Hawkes, L. A., A. C. Broderick, M. H. Godfrey and B. J. Godley. 2007. Investigating the potential impacts of climate change on a marine turtle population. Global Change Biology. 13 (5): 923-932.

Hayden, J., G. Ardt, M. Fleming, T. W. Keegan, J. Peek, T. O. Smith and A. Wood. 2008. Habitat guidelines for mule deer: Northern forest ecoregion Mule Deer Working Group, Western Association of Fish and Wildlife Agencies, USA, . 48 p.

Hayes, D. J. 2011. Facing the inevitable agency efforts to collaborate on climate change. The Wildlife Professional. 5 (3): 25-30.

Hays, D. W., M. J. Tirhi and D. W. Stinson. 1998. Washington State status report for the sage grouse. Washington Department of Fish and Wildlife, Olympia, WA. 62 p.

Hayward, G. D., N. M. Warren, B. Parrish, M. Williams, C. Liggett and V. Starostka. 2004. Region 2 Management Indicator Species selection process and criteria. USDA Forest Service, Rocky Mountain Region, Lakewood, CO. 15 p.

Heath, L. S., J. E. Smith, C. W. Woodall, D. L. Azuma and K. L. Waddell. 2011. Carbon stocks on forestland of the United States, with emphasis on USDA Forest Service ownership. Ecosphere. 2 (art6): 21 p.

Heller, N. E. and E. S. Zavaleta. 2009. Biodiversity management in the face of climate change: A review of 22 years of recommendations. Biological Conservation. 142 (1): 14-32.

Hellman, J. J., J. E. Byers, B. G. Bierwagen and J. S. Dukes. 2008. Five potential consequences of climate change for invasive species. Conservation Biology. 22 (3): 534-543.

Helvey, J. D. 1980. Effects of a north-central Washington wildfire on runoff and sediment production. Water Resources Bulletin. 16 (4): 627-634.

Helvey, J. D. and W. B. Fowler. 1995. Umatilla National Forest barometer watershed program. Effects of timber harvest on the hydrology and climate of four small watersheds. Umatilla National Forest, Supervisor's Office, Pendleton, Oregon. 128 pp.

Hemstad, N. A. and R. M. Newman. 2006. Local and landscape effects of past forest harvest on stream habitat and fish assemblages. In: American Fisheries Society Symposium 48, 413-427.

Hemstrom, M. A., J. J. Korol and W. J. Hann. 2001. Trends in terrestrial plant communities and landscape health indicate the effects of alternative management strategies in the interior Columbia River basin. Forest Ecology and Management. 153 (1-3): 1-21.

Hemstrom, M. A., J. Merzenich, A. Reger and B. Wales. 2007. Integrated analysis of landscape management scenarios using state and transition models in the upper Grande Ronde River Subbasin, Oregon, USA. Landscape and Urban Planning. 80 (3): 198-211.

Heninger, R. L., W. Scott, A. Dobkowski, R. Miller, H. Anderson and S. Duke. 2002. Soil disturbance and 10-year growth response of coast Douglas-fir on nontilled and tilled skid trails in the Oregon Cascades. Canadian Journal of Forest Research. 32: 233-246.

Herndon, C. N., S. Shanthalingam, D. P. Knowles, D. R. Call and S. Srikumaran. 2011. Comparison of passively transferred antibodies in bighorn and domestic lambs reveals one factor in differential susceptibility of these species to Mannheimia haemolytica-induced pneumonia. Clinical and Vaccine Immunology. 18 (7): 1133-1138.

Hess, G. R. 1994. Conservation corridors and contagious disease: A cautionary note. Conservation Biology. 8 (1): 256-262.

Hessburg, P. F. and J. K. Agee. 2003. An environmental narrative of Inland Northwest United States forests, 1800–2000. Forest Ecology and Management. 178 (1-2): 23-59.

Hessburg, P. F., J. K. Agee and J. F. Franklin. 2005. Dry forests and wildland fires of the inland northwest USA: Contrasting the landscape ecology of the pre-settlement and modern eras. Forest Ecology and Management. 211 (1-2): 117-139.

Hessburg, P. F., D. J. Churchill, A. J. Larson, R. D. Haugo, C. Miller, T. A. Spies, M. P. North, N. A. Povak, R. T. Belote, P. H. Singleton, W. L. Gaines, R. E. Keane, G. H. Aplet, S. L. Stephens, P. Morgan, P. A. Bisson, B. E. Rieman, R. B. Salter and G. H. Reeves. 2015. Restoring fire-prone Inland Pacific landscapes: seven core principles. Landscape Ecology. 30 (10)

Hessburg, P. F., R. G. Mitchell and G. M. Filip. 1994. Historical and current roles of insects and pathogens in eastern Oregon and Washington forested landscapes. In: Eastside Forest Health Assessment. Volume III: Assessment, Everett, R. L. and P. F. Hessburg, eds. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 72 p. .

Hessburg, P. F., R. B. Salter and K. M. James. 2007. Re-examining fire severity relations in pre-management era mixed conifer forests: inferences from landscape patterns of forest structure. Landscape Ecology. 22 (S1): 5-24.

Hessburg, P. F., B. G. Smith, S. D. Kreiter, C. A. Miller, R. B. Salter, C. H. McNicholl and W. J. Hann. 1999. Historical and current forest and range landscapes in the interior Columbia River basin and portions of the Klamath and Great basins; Part 1: linking vegetation patterns and landscape vulnerability to potential insect and pathogen disturbances. General Technical Report PNW-GTR-458. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 357 p.

Hessburg, P. F., T. A. Spies, D. A. Perry, C. N. Skinner, A. H. Taylor, P. M. Brown, S. L. Stephens, A. J. Larson, D. J. Churchill, N. A. Povak, P. H. Singleton, B. McComb, W. J. Zielinski, B. M. Collins, R. B. Salter, J. J. Keane, J. F. Franklin and G. Riegel. 2016. TAMM Review: Management of mixed-severity fire regime forests in Oregon, Washington, and Northern California. Forest Ecology and Management. 366 (15 April): 221-250.

Hessl, A. E., D. McKenzie and R. Schellhaas. 2004. Drought and Pacific Decadal Oscillation linked to fire occurrence in the inland Pacific Northwest. Ecological Applications. 14 (2): 425-442.

Heyerdahl, E. K. 1997. Spatial and temporal variation in historical fire regimes of the Blue Mountains, Oregon and Washington: the influence of climate. Ph.D. dissertation, University of Washington, College of Forest Resources, Seattle, WA.

Heyerdahl, E. K. and J. K. Agee. 1996. Historical fire regimes of four sites in the Blue Mountains, Oregon and Washington. University of Washington, College of Forest Resources, Seattle, WA.

Heyerdahl, E. K., L. B. Brubaker and J. K. Agee. 2001. Spatial controls of historical fire regimes: a multiscale example from the interior west, USA. Ecology. 82 (3): 660-678.

Heyerdahl, E. K., D. McKenzie, L. D. Daniels, A. E. Hessl, J. S. Littell and N. J. Mantua. 2008. Climate drivers of regionally synchronous fires in the inland northwest (1651-1900). International Journal of Wildland Fire. 17 (1): 40-49.

Hibbert, A. R. 1967. Forest treatment effects on water yield. In: Forest Hydrology, Proceedings of a National Science Foundation Advanced Science Seminar, Sopper, W. E. and H. W. Lull, eds. Pergamon Press, University Park, Pennsylvania. 527-543.

Hicks, B. J., R. L. Beschta and R. D. Harr. 1991. Long-term changes in streamflow following logging in western Oregon and associated fisheries implications. Water Resources Bulletin. 27 (2): 217-226.

Hilbert, J. and A. Wiensczyk. 2007. Old-growth definitions and management: A literature review. Journal of Ecosystems and Management. 8 (1): 18 p.

Hill, J. L. and K. L. Gray. 2004. Conservation strategy for Spalding's catchfly (*Silene spaldingii Wats*.). Unpublished report prepared by the Idaho Conservation Data Center for the USDI Fish and Wildlife Service, February 2004. 153 pp. plus appendices.

Hillis, J. M., M. J. Thompson, J. E. Canfield, L. J. Lyon, C. L. Marcum, P. M. Dolan and D. W. McCleery. 1991. Defining elk security: The Hillis paradigm In: Proceedings for symposium on elk vulnerability, Christensen, A. G., L. J. Lyon and T. N. Lonner, eds. Montana State University, Bozeman, MT. 38-54.

Hills, R. C. 1971. The influence of land management and soil characteristics on infiltration and the occurrence of overland flow. Journal of Hydrology. 13 (1): 163-181.

Hilty, J. A., W. Z. Lidicker, Jr. and A. Merenlender. 2012. Corridor ecology: The science and practice of linking landscapes for biodiversity conservation. Island Press, Covelo, CA.

Hixon, M. A., S. V. Gregory, W. D. Robinson, C. S. Baker, H. P. Batchelder, C. Epps, T. S. Garcia, S. M. Haig, R. M. Letelier, D. A. Lytle, B. A. Menge, J. C. Miller, D. L. G. Noakes, W. T. Peterson, J. M. Rice, S. S. Rumrill, C. B. Schreck, R. M. Suryan, M. D. Sytsma and A. E. White. 2010. Oregon's Fish and Wildlife in a Changing Climate, Chapter 7. In: Oregon Climate Assessment Report, Dello, K. D. and P. W. Mote, eds. Oregon Climate Change Research Institute, College of Oceanic and Atmospheric Sciences, Oregon State University, Corvallis, OR. 268-361.

Hobbs, R. J. 1992. The role of corridors in conservation: Solution or bandwagon? Trends in Ecology & Evolution. 7 (11): 389-392.

Hodkinson, D. J. and K. Thompson. 1997. Plant dispersal: the role of man. Journal of Applied Ecology. 34: 1484-1496.

Holden, Z. A., C. H. Luce, M. A. Crimmins and P. Morgan. 2012. Wildfire extent and severity correlated with annual streamflow distribution and timing in the Pacific Northwest, USA (1984-2005). Ecohydrology. 5 (5): 677-684.

Holechek, J. L. 1988. An approach for setting the stocking rate. Rangelands. 10 (1): 10-14.

Holechek, J. L. 1992. Financial benefits of range management practices in the Chihuahuan desert. Rangelands. 14 (5): 279-284.

Holechek, J. L. 1993. Managing stocking rates to achieve range resource goals. Cox, J. R. and J. F. Cadenhead. Managing livestock stocking rates on rangeland. Texas Agricultural Extension Service, Victoria, TX. 10-28.

Holechek, J. L., T. T. Baker, J. C. Boren and D. Galt. 2006. Grazing impacts on rangeland vegetation: what we have learned. Rangelands. 28 (1): 7-13.

Holechek, J. L. and D. Galt. 2000. Grazing intensity guidelines. Rangelands. 22 (3): 11-14.

Holechek, J. L., H. Gomez, F. Molinar and D. Galt. 1999. Grazing studies: What we've learned. Rangelands. 21 (2): 12-16.

Holechek, J. L., A. Tembo, A. Daniel, M. J. Fusco and M. Cardenas. 1994. Long-term grazing influences on Chihuahuan desert rangeland. The Southwestern Naturalist. 39 (4): 342-349.

Hollenbeck, J. P., L. J. Bate, V. A. Saab and J. F. Lehmkuhl. 2013. Snag distributions in relation to human access in ponderosa pine forests. Wildlife Society Bulletin. 37 (2): 256-266.

Holling, C. S. 1973. Resilience and stability of ecological systems. Annual Review of Ecology and Systematics. 4: 1-23.

Holling, C. S. and G. K. Meffe. 1996. Command and control and the pathology of natural resource management. Conservation Biology. 10 (2): 328-337.

Holmes, R., L. Croft and R. R. Clausnitzer. 2009. Plant species assessments for Region 6 Forest Plan revisions. unpuplished report. U.S.Department of Agriculture, Forest Service, Pacific Northwest Region, Portland, OR. 8 p.

Holsinger, L., S. A. Parks and C. Miller. 2016. Weather, fuels, and topography impede wildland fire spread in western US landscapes. Forest Ecology and Management. 380: 59-69.

Hoover, K. 2016. Forest Service Appropriations: Five-Year Data and Trends and FY2017 Budget Request. Congressional Research Service Report. Congressional Research Service, Washington DC. 17 p.

Hough-Snee, N., A. Kasprak, R. K. Rossi, N. Bouwes, B. B. Roper and J. M. Wheaton. 2015. Hydrogeomorphic and biotic drivers of instream wood differ across sub-basins of the Columbia River Basin, USA. River Research and Applications. doi: 10.1002/rra.2968

Hovee, E. and T. Jordan. 2005. Baseline growth and mortality assessment. Report prepared for Oregon Forest Resource Institute. E.D. Hovee & Company, Vancouver, WA.

Howell, P. J. 2006. Effects of wildfire and subsequent hydrologic events on fish distribution and abundance in tributaries of North Fork John Day River. North American Journal of Fisheries Management. 26 (4): 983-994.

Hughes, L. E. 1990. Twenty years of rest-rotation grazing on the Arizona Strip: An observation. Rangelands. 12 (3): 173-176.

Hungerford, R. D., M. G. Harrington, W. H. Frandsen, K. C. Ryan and G. J. Niehoff. 1991. Influence of fire on factors that affect site productivity. In: Proceedings-management and productivity of western-montane forest soils, General Technical Report PNW-GTR-280, Neuenschwander, F. L. and A. E. Harvey, eds. U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Ogden, UT. 32-50.

Hunter, M. L., Jr., G. L. Jacobson, Jr. and Thompson Webb, III. 1988. Paleoecology and the coarse-filter approach to maintaining biological diversity. Conservation Biology. 2 (4): 375-385.

Huntington, T. G. 2008. CO2-induced suppression of transpiration cannot explain increasing runoff. Hydrological Processes. 22 (2): 311-314.

Hupp, C. R. and W. R. Osterkamp. 1985. Bottomland vegetation distribution along Passage Creek, Virginia, in relation to fluvial landforms. Ecology. 66 (3): 670-681.

Hurteau, M. D. and M. North. 2009. Fuel treatment effects on tree-based forest carbon storage and emissions under modeled wildfire scenarios. Ecology and the Environment. 7 (8): 409-414.

Hustafa, J. pers. comm. email and follow-up telephone conversation from Jerry Hustafa to Gene Yates regarding recommendations for the timing of livestock deferment from habitat occupied by Spalding's catchfly, January 23, 2017. Yates, G.

I

IMPLAN Group, Inc. 2014. IMPLAN Industry Detail and FEIS Chart. IMPLAN, Corporate Headquarters, Huntersville, NC. 3 p.

Independent Multidisciplinary Science Team [IMST]. 1999. Recovery of wild salmonids in western Oregon forests: Oregon Forest Practices Act rules and the measures in the Oregon Plan for salmon and watersheds. Technical Report 1999-1. Governor's Natural Resource Office, Salem, Oregon.

Independent Scientific Advisory Board [ISAB]. 2007. Climate change impacts on Columbia River Basin fish and wildlife. ISAB 2007-2. Independent Scientific Advisory Board for the Northwest Power Planning Council, the Columbia River Basin Indian Tribes, and the National Marine Fisheries Service, Portland, OR. 146 p.

Ingelfinger, F. and S. Anderson. 2004. Passerine response to roads associated with natural gas extraction in a sagebrush steppe habitat. Western North American Naturalist. 64 (3): 385–395.

Intergovernmental Panel on Climate Change [IPCC]. 2000. IPCC Special Report, Emissions Scenarios, Summary for Policymakers. World Meteorological Organization, Geneva.

Irwin, L. L., J. G. Cook, R. A. Riggs and J. M. Skovlin. 1994. Effects of long-term grazing by big game and livestock in the Blue Mountains forest ecosystems. General Technical Report PNW-GTR-325. Pacific Northwest Research Station, Portland, Oregon. 49 pp.

Isaak, D. J., C. H. Luce, B. E. Rieman, D. E. Nagel, E. E. Peterson, D. L. Horan, S. Parkes and G. L. Chandler. 2010. Effects of climate change and wildfire on stream temperatures and salmonid thermal habitat in a mountain river network. Ecological Applications. 20 (5): 1350-1371.

Isaak, D. J., K. Ramsey, J. C. Chatel, D. L. Konnoff, R. A. Gecy and D. Horan. 2017. Climate change, fish, and aquatic habitat in the Blue Mountains [Chapter 5]. In: Climate change vulnerability and adaptation in the Blue Mountains. Gen. Tech. Rep. PNW-GTR-939, Halofsky, J. E. and D. L. Peterson, eds. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 91-148.

Isaak, D. J., S. Wollrab, D. Horan and G. Chandler. 2012. Climate change effects on stream and river temperatures across the northwest US from 1980–2009 and implications for salmonid fishes. Climatic Change. 113: 499-524.

Isaak, D. J., M. K. Young, C. H. Luce, S. W. Hostetler, S. J. Wenger, E. E. Peterson, J. M. Ver Hoef, M. C. Groce, D. L. Horan and D. E. Nagel. 2016. Slow climate velocities of mountain streams portend their role as refugia for cold-water biodiversity. Proceedings of the National Academy of Sciences. 113 (16): 4374-4379.

Isaak, D. J., M. K. Young, D. E. Nagel, D. L. Horan and M. C. Groce. 2015. The cold-water climate shield: delineating refugia for preserving salmonid fishes through the 21st century. Global Change Biology. 21 (7): 2540-2553.

J

Jacob, D. J. and D. A. Winner. 2009. Effect of climate change on air quality. Atmospheric Environment. 43 (1): 51-63.

Jaindl, R. G., P. S. Doescher and L. E. Eddleman. 1993. Influence of water relations on the limited expansion of *Pinus monophylla* into adjacent *Cerocarpus ledifolius* communities in the central Great Basin. Forest Science. 39 (4): 629-643.

R.G. Jaindl, T.M. Quigley, R. Harrod. 1996. Forest health issues and resources of the Blue Mountains. In: R.G. Jaindl, T.M. Quigley (Eds.), Search for a Solution: Sustaining The Land, People, and Economy of the Blue Mountains, American Forests, Washington, DC, pp. 1-10

James Kent Associates. 2006. Community Reports in Support of the Planning Effort in BLM's Baker Resource Area. Report prepared by: K. Preister, D. Schultz, J. Resnick, A. Tama-Sweet and J.A. Kent. James Kent Associates: Global Cultural Analysts, Basalt, CO. 178p.

Jang, W., C. R. Keyes and D. Page-Dumroese. 2015. Impact of biomass harvesting on forest soil productivity in the northern Rocky Mountains. General Technical Report RMRS-GTR-341. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO. 35 p.

Jansen, V. S. and R. V. Taylor. 2010. Mapping and monitoring Spalding's catch-fly (*Silene spaldingii*) Crow Creek – Wallowa-Whitman National Forest. Report prepared by the Nature Conservancy.

Jenkins, M. L. 2015. Major forest insect and disease conditions in the United States: 2013. Forest Service FS-1054. US Department of Agriculture, Forest Service, Washington, DC. 54p.

Jennings, M. 2016. Trends, risks, and climate for a 2016 NEPA categorical exclusion application: Malheur, Umatilla, and Wallowa-Whitman National Forests, U.S. Department of Agriculture, Forest Service. Blue Mountains Forest Insect and Disease Service Center and Northeast Oregon Ecology Program, La Grande, OR. 7p.

Jennings, S. B., N. D. Brown and D. Sheil. 1999. Assessing forest canopies and understorey illumination: canopy closure, canopy cover and other measures. Forestry. 72 (1): 59-74.

Jenny, H. 1941 (republished 1994). Factors of soil formation: a system of quantitative pedology. McGraw-Hill, New York.

Jensen, H. P., D. Rollins and R. L. Gillen. 1990. Effects of cattle stock density on trampling loss of simulated ground nests. Wildlife Society Bulletin. 18 (1): 71-74.

Johnson, B. K., J. W. Kern, M. J. Wisdom, S. L. Findholt and J. G. Kie. 2000. Resource selection and spatial separation of mule deer and elk during spring. The Journal of Wildlife Management. 64 (3): 685-697.

Johnson, B. K., M. J. Wisdom and J. G. Cook. 2005. Issues of elk productivity for research and management. In: The Starkey Project: a synthesis of long-term studies of elk and mule deer. Reprinted from the 2004 Transactions of the North American Wildlife and Natural Resources Conference, Wisdom, M. J., ed. Alliance Communications Group, Lawrence, KS. 81-93.

Johnson, C. G., Jr. 1994. Forest health in the Blue Mountains: a forest ecologist's perspective on ecosystem processes and biological diversity. General Technical Report PNW-GTR-339. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, Oregon. 23 pp.

Johnson, C. G., Jr. 1998. Vegetation response after wildfires in national forests of northeastern Oregon. R6-NR-ECOL-TP-06-98. USDA Forest Service, Pacific Northwest Region, Wallowa Whitman National Forest, Portland, OR. 164 p.

Johnson, C. G., Jr. 2003. Green fescue rangelands: changes over time in the Wallowa Mountains. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

Johnson, C. G., Jr. and R. R. Clausnitzer. 1992. Plant associations of the Blue and Ochoco Mountains. Publication R6-ERW-TP-036-92. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Wallowa-Whitman National Forest, Portland, OR. 164 p.

Johnson, C. G., R. R. Clausnitzer, P. J. Mehringer and C. D. Oliver. 1994. Biotic and abiotic processes in eastside ecosystems: the effects of management on plant and community ecology and on stand and landscape vegetation dynamics. General Technical Report PNW-GTR-322, from Volume III, assessment, Everett, R. L., Assessment Team Leader, and Hessburg, P. F., Science Team Leader. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 66 p.

Johnson, C. G., Jr. and S. A. Simon. 1987. Plant associations of the Wallowa-Snake province. R6-ECOL-TP-225A-86. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Wallowa-Whitman National Forest, Baker City, Oregon. 272 p.

Johnson, C. G. and D. K. Swanson. 2005. Bunchgrass plant communities of the Blue and Ochoco mountains: A guide for managers. General Technical Report PNW-GTR-641. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

Johnson, D. H. and T. A. O'Neil, eds. 2001. Wildlife-habitat relationships in Oregon and Washington. Oregon State University Press, Corvallis. 736 p.

Johnson, D. W. and P. S. Curtis. 2001. Effects of forest management on soil C and N storage: meta analysis. Forest Ecology and Management. 140 (2-3): 227-238.

Johnson, E. A. and D. R. Wowchuk. 1993. Wildfires in the southern Canadian Rocky Mountains and their relationship to mid-tropospheric anomalies. Canadian Journal of Forest Research. 23 (6): 1213-1222.

Johnson, W. C. 2000. Tree recruitment and survival in rivers: influence of hydrological processes. Hydrological Processes. 14 (16-17): 3051-3074.

Johnston, J. D. 2016. Forest successional and disturbance dynamics in the southern Blue Mountains of eastern Oregon. Ph.D. dissertation, Oregon State University, Corvallis.

Johnston, J. D., J. D. Bailey and C. J. Dunn. 2016. Influence of fire disturbance and biophysical heterogeneity on pre-settlement ponderosa pine and mixed conifer forests. Ecosphere. 7 (11): e01581

Jones, J. A. 2000. Hydrologic processes and peak discharge response to forest removal, regrowth, and roads in 10 small experimental basins, western Cascades, Oregon. Water Resources Research. 36 (9): 2621-2642.

Jones, J. A. and G. E. Grant. 1996. Peak flow responses to clear-cutting and roads in small and large basins, western Cascades, Oregon. Water Resources Research. 32 (4): 959-974.

Jones, T. and W. Cresswell. 2009. The phenology mismatch hypothesis: are declines of migrant birds linked to uneven global climate change? Journal of Animal Ecology. 79: 98-108.

Jorgensen, J. C., J. M. Honea, M. M. McClure, T. D. Cooney, K. Engie and D. M. Holzer. 2009. Linking landscape-level change to habitat quality: an evaluation of restoration actions on the freshwater habitat of spring-run Chinook salmon. Freshwater Biology. 54 (7): 1560-1575.

Jurgensen, M. F., A. E. Harvey, R. T. Graham, D. S. Page-Dumroese, J. R. Tonn, M. J. Larsen and T. B. Jain. 1997. Impacts of timber harvesting on soil organic matter, nitrogen, productivity, and health of inland northwest forests. Forest Science. 43 (2): 234-251.

K

Kaetzel, B. R. 2015. Oregon Forest Sector Economic Report. Report prepared for the Oregon Board of Forestry. Salem, OR. 11p.

Kagan, J. 1989. Draft species management guide for *Silene spaldingii*. Oregon Natural Heritage Data Base. on file, Portland, Oregon.

Kalies, E. L. and L. L. Yokum Kent. 2016. Tamm Review: Are fuel treatments effective at achieving ecological and social objectives? A systematic review. Forest Ecology and Management. 375: 84-95.

Kapnick, S. and A. Hall. 2011. Causes of recent changes in western North American snowpack. Climate Dynamics. 38 (9-10): 1885-1899.

Karrenberg, S., P. J. Edwards and J. Kollmann. 2002. The life history of Salicaceae living in the active zone of floodplains. Freshwater Biology. 47 (4): 733-748.

Kattelman, R. C., N. H. Berg and J. Rector. 1983. The potential for increasing streamflow from Sierra Nevada watersheds. Water Resources Bulletin. 19 (3): 395-402.

Kauffman, J. B. and W. C. Krueger. 1984. Livestock impacts on riparian ecosystems and streamside management implications...a review. Journal of Range Management. 37 (5): 430-438.

Kauffman, J. B., A. S. Thorpe and E. N. J. Brookshire. 2004. Livestock exclusion and belowground ecosystem responses in riparian meadows in eastern Oregon. Ecological Applications. 14 (6): 1671-1679.

Kaufmann, M., D. Binkley, P. Z. Fulé, M. Johnson, S. L. Stephens and T. W. Swetnam. 2007. Defining old growth for fire-adapted forests of the western United States. Ecology and Society. 12 (2): http://www.ecologyandsociety.org/vol12/iss2/art15/.

Kaufmann, M., R. T. Graham, D. A. Boyce, Jr., W. H. Moir, L. Perry, R. T. Reynolds, R. L. Bassett, P. Mehlhop, C. B. Edminster, W. M. Block and P. S. Corn. 1994. An Ecological Basis for Ecosystem Management. General Technical Report, RM-246. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 22 p.

Keane, R. E., P. F. Hessburg, P. B. Landres and F. J. Swanson. 2009. The use of historical range and variability (HRV) in landscape management. Forest Ecology and Management. 258 (7): 1025-1037.

Keane, R. E., R. A. Parsons and P. F. Hessburg. 2002. Estimating historical range and variation of landscape patch dynamics: limitations of the simulation approach. Ecological Modelling. 151 (1): 29-49.

Keane, R. E., D. F. Tomback, C. A. Aubry, A. D. Bower, E. M. Campbell, C. L. Cripps, M. B. Jenkins, M. F. Mahalovich, M. Manning, S. T. McKinney, M. P. Murray, D. L. Perkins, D. P. Reinhart, C. Ryan, A. W. Schoettle, C. M. Smith, D. 2012. A range-wide restoration strategy for whitebark pine (*Pinus albicaulis*). General Technical Report RMRS-GTR-279. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO. 108 p.

Keeley, J. E. 2009. Fire intensity, fire severity and burn severity: a brief review and suggested usage. International Journal of Wildland Fire. 18 (1): 116-126.

Keeton, W. S., P. W. Mote and J. F. Franklin. 2007. Climate variablity, climate change, and western wildfire with implications for the urban-wildland interface. In: Living on the edge: economic, institutional and management perspectives on wildfire hazard in the urban interface advances in the economics of environmental resources, Volume 6, Troy, A. and R. G. Kennedy, eds. Elsevier, Oxford, UK. 225-253.

Kelsall, J. P. 1981. Status report on the wolverine, *Gulo gulo*, in Canada in 1981. Committee on the Status of Endangered Wildlife in Canada, Ottawa, ON. 47 p.

Kennedy, P. L. and J. B. Fontaine. 2009. Synthesis of knowledge on the effects of fire and fire surrogates on wildlife in U.S. dry forests. Oregon State University, Corvallis, OR. 132 p.

Keppeler, E. T. and R. R. Ziemer. 1990. Logging effects on streamflow: water yield and summer low flows at Caspar Creek in northwestern California. Water Resources Research. 26 (7): 1669-1679.

Kershner, J. L., M. Coles-Ritchie, E. Cowley, R. C. Henderson, K. Kratz, C. Quimby, D. M. Turner, L. C. Ulmer and M. R. Vinson. 2003. A plan to monitor the aquatic and riparian resources in the area of PACFISH/INFISH and the Biological Opinions for bull trout, salmon, and steelhead. U.S. Forest Service, Fish & Aquatic Ecology Unit, PACFISH/INFISH Biological Opinion, Effectiveness Monitoring Program, Logan, Utah. 104 p.

Kershner, J. L., B. B. Roper, N. Bouwes, R. Henderson and E. Archer. 2004. An analysis of stream habitat conditions in reference and managed watersheds on some Federal lands within the Columbia River basin. North American Journal of Fisheries Management. 24 (4): 1363-1375.

Ketcheson, G. L. and W. F. Megahan. 1996. Sediment production and downslope sediment transport from forest roads in granitic watersheds. Research Paper INT-RP-486. USDA Forest Service, Intermountain Research Station, Ogden, Utah. 11 pp.

Keyser, T. L., F. W. Smith and W. D. Shepperd. 2009. Short-term impact of post-fire salvage logging on regeneration, hazardous fuel accumulation, and understorey development in ponderosa pine forests of the Black Hills, SD, USA. International Journal of Wildland Fire. 18 (4): 451-458.

Kie, J. G., C. J. Evans, E. R. Loft and J. W. Menke. 1991. Foraging behavior by mule deer: The influence of cattle grazing. Journal of Wildlife Management. 55 (4): 665-674.

Kimmins, J. P. 2004. Forest Ecology: A Foundation for Sustainable Forest Management and Environmental Ethics in Forestry. Prentice Hall, Third.

Kimoto, C. 2010. Effect of livestock grazing on native bees in a Pacific Northwest bunchgrass prairie. M.S. thesis, Oregon State University, Corvallis, OR. 135 p.

Kimoto, C., S. J. DeBano, R. W. Thorp, R. V. Taylor, H. Schmalz, T. DelCurto, T. Johnson, P. L. Kennedy and S. Rao. 2012. Short-term responses of native bees to livestock and implications for managing ecosystem services in grasslands. Ecosphere. 3 (10): 88.

Kirschbaum, M. U. F. 2000. Will changes in soil organic carbon act as a positive or negative feedback on global warming? Biogeochemistry. 48 (1): 21-51.

Klenner, W., W. Kurz and S. Beukema. 2000. Habitat patterns in forested landscapes: management practices and the uncertainty associated with natural disturbances. Computers and Electronics in Agriculture. 27 (1-3): 243-262.

Klipple, G. E. and R. E. Bement. 1961. Light grazing: Is it economically feasible as a range-improvement practice. Journal of Range Management. 14 (2): 57-62.

Klock, G. O. 1982. Some soil erosion effects on forest soil productivity. In: Determinants of Soil Loss Tolerance, Schmidt, B. L., ed. American Society of Agronomy and Soil Science Society of America, Madison, WI. 53-66.

Knapp, P. A. 1989. Natural recovery of compacted soils in semiarid Montana. Physical Geography. 10 (2): 165-175.

Knapp, P. A. 1991. Long-term soil and vegetation recovery in five semiarid Montana ghost towns. The Professional Geographer. 43 (4): 486-499.

Knighton, D. 1998. Fluvial forms and processes: a new perspective. Oxford University Press, New York.

Knowles, N., M. Dettinger and D. Cayan. 2006. Trends in snowfall versus rainfall for the western United States. Journal of Climate. 19 (18): 4545-4559.

Kolb, D. 1984. Experiential education: Experience as the source of learning and development. Englewood Cliffs, NJ. FT Press, 256 p.

Kolb, T. E., J. K. Agee, P. Z. Fulé, N. G. McDowell, K. Pearson, A. Sala and R. H. Waring. 2007. Perpetuating old ponderosa pine. Forest Ecology and Management. 249 (3): 141-157.

Kolb, T. E., C. J. Fettig, M. P. Ayres, B. J. Bentz, J. A. Hicke, R. Mathiasen, J. E. Stewart and A. S. Weed. 2016. Observed and anticipated impacts of drought on forest insects and diseases in the United States. Forest Ecology and Management. 380 (Supplement C): 321-334.

Kostow, K. 2003. Factors that influence evolutionarily significant unit boundaries and status assessment in a highly polymorphic species, Oncorhynchus mykiss, in the Columbia Basin. Information Report #2003-04. Oregon Department of Fish and Wildlife, Portland, OR. 122 p.

Kovalchik, B. L. and L. A. Chitwood. 1990. Use of geomorphology in the classification of riparian plant associations in mountainous landscapes of central Oregon, USA. Forest Ecology and Management. 33/34: 405-418.

Krausman, P. R., R. Etchberger and R. M. Lee. 1996. Persistence of mountain sheep populations in Arizona. The Southwestern Naturalist. 41 (4): 399-402.

Krebs, J., E. C. Lofroth and I. Parfitt. 2007. Multiscale habitat use by wolverines in British Columbia, Canada. The Journal of Wildlife Management. 71 (7): 2180-2192.

Krist, F., J. R. Ellenwood, M. E. Woods, A. J. McMahon, J. P. Cowardin, D. E. Ryerson, F. J. Spaio, M. O. Zweifler and S. A. Romero. 2014. 2013 - 2027 National insect and disease forest risk assessment. FHTET-14-01. USDA Forest Service, Forest Health Technology Enterprise Team, Fort Collins, CO. 199p.

L

Lakel, W. A., III, W. M. Aust, M. C. Bolding, C. A. Dolloff, P. Keyser and R. Feldt. 2010. Sediment trapping by streamside management zones of various widths after forest harvest and site preparation. Forest Science. 56 (6): 541-551.

Lal, R. 2008. Carbon sequestration. Philosophical Transactions of the Royal Society B: Biological Sciences. 363 (1492): 815-830.

Lambeck, R. J. 1997. Focal species: a multi-species umbrella for nature conservation. Conservation Biology. 11 (4): 849-856.

Lamberti, G. A., S. V. Gregory, L. R. Askenas, R. C. Wildman and K. M. S. Moore. 1991. Stream ecosystem recovery following a catastrophic debris flow. Canadian Journal of Fisheries and Aquatic Sciences. 48 (2): 196-208.

Landres, P., W. M. Vagias and S. Stutzman. 2011. Using wilderness character to improve wilderness stewardship. Park Science. 28 (3)

Landres, P. B., P. Morgan and F. J. Swanson. 1999. Overview of the use of natural variability concepts in managing ecologicial systems. Ecological Applications. 9 (4): 1179-1188.

Landres, P. B., J. Verner and J. W. Thomas. 1988. Ecological uses of vertebrate indicator apecies: A critique. Conservation Biology. 2 (4): 316-328.

Langston, N. 1995. Forest dreams, forest nightmares: the paradox of old growth in the inland west. University of Washington Press, Seattle, WA.

Larsen, T. and W. J. Ripple. 2006. Modeling gray wolf (Canis lupus) habitat in the Pacific Northwest, USA. Journal of Conservation Planning. 2 (1): 30-61.

Larson, A. J. and D. Churchill. 2012. Tree spatial patterns in fire-frequent forests of western North America, including mechanisms of pattern formation and implications for designing fuel reduction and restoration treatments. Forest Ecology and Management. 267: 74-92.

Latta, G., H. Temesgen, D. Adams and T. Barrett. 2010. Analysis of potential impacts of climate change on forests of the United States Pacific Northwest. Forest Ecology and Management. 259 (4): 720-729.

Lawler, J. J. and M. R. Mathias. 2007. Climate change and the future of biodiversity in Washington. Perpared by teh Washington Biodiversity Council. College of Forest Resources, University of Washington, Seattle. 42 p.

Lawler, J. J., S. L. Shafer, D. White, P. Kareiva, E. P. Maurer, A. R. Blaustein and P. J. Bartlein. 2009. Projected climate-induced faunal change in the western hemisphere. Ecology. 90 (3): 588-597.

Lawrence, D. J., J. D. Olden and C. E. Torgersen. 2012. Spatiotemporal patterns and habitat associations of smallmouth bass (Micropterus dolomieu) invading salmon-rearing habitat. Freshwater Biology. 57 (9): 1929-1946.

Lawrence, D. J., B. Stewart-Koster, J. D. Olden, A. S. Ruesch, C. E. Torgersen, J. J. Lawler, D. P. Butcher and J. K. Crown. 2014. The interactive effects of climate change, riparian management, and a nonnative predator on stream-rearing salmon. Ecological Applications. 24 (4): 895-912.

Laycock, W. A. 1991. Stable states and thresholds of range condition in North American rangelands: a viewpoint. Journal of Range Management. 44 (5): 427-433.

Laycock, W. A. 1994. Implications of grazing vs. no grazing on today's rangelands, Vavra, M., ed. Ecological implications of livestock herbivory in the west, Denver, Colorado, Society of Range Management, 251-280.

Lee, D. C., J. R. Sedell, B. E. Rieman, R. F. Thurow, J. E. Williams, D. Burns, J. Clayton, L. Decker, R. Gresswell, R. House, P. Howell, K. M. Lee, K. MacDonald, J. McIntyre, S. McKinney, T. Noel, J. E. O'Connor, C. K. Overton, D. Perkinson, K. Tu and P. Van Eimeren. 1997. Broadscale assessment of aquatic species and habitats, Chapter 4, General Technical Report PNW-GTR-405, Volume III. In: An assessment of ecosystem components in the interior Columbia basin and portions of the Klamath and Great Basins, Quigley, T. M. and S. J. Arbelbide, eds. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 1057-1496.

Lehmkuhl, J. F., P. F. Hessburg, R. L. Everett, M. H. Huff and R. D. Ottmar. 1994. Historical and current forest landscapes of eastern Oregon and Washington Part I: Vegetation pattern and insect and disease hazards. General Technical Report PNW-GTR-328, (Everett, Richard L.; team leader; Eastside forest ecosystem health assessment; Hessburg, Paul F., science team leader and tech. ed., Volume III: assessment.). U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 88 p.

Lehmkuhl, J. F., M. Kennedy, E. D. Ford, P. H. Singleton, W. L. Gaines and R. L. Lind. 2007. Seeing the forest for the fuel: Integrating ecological values and fuels management. Forest Ecology and Management. 246 (1): 73-80.

Lehmkuhl, J. F., M. G. Raphael, R. S. Holthausen, J. R. Hickenbottom, R. H. Naney and J. S. Shelly. 1997. Chapter 4- Historical and current status of terrestrial species and the effects of proposed alternatives. In: Evaluation of EIS alternatives by the science integration team, Volume II, General Technical Report PNW-GTR-406, Quigley, T., K. H. Lee and S. J. Arbelbide, eds. USDA Forest Service, Pacific Northwest Research Station, Portland, OR. 539-1094.

Leopold, L. B. and W. B. Bull. 1979. Base level, aggradation, and grade. Proceedings of the American Philosophical Society. 123 (3): 168-202.

Leopold, L. B. and T. Maddock. 1953. The hydraulic geometry of stream channels and some physiographic implications. U.S. Geological Survey Professional Paper 252. U.S Department of Interior, Washington, DC. 57 pp.

Leopold, L. B., M. G. Wolman and J. P. Miller. 1964. Fluvial Processes in Geomorphology. Freeman, San Francisco, California.

Lesica, P. 1993. Loss of fitness resulting from pollinator exclusion in *Silene spaldingii* (Caryophyllaceae). Madroño. 40: 193-201.

Lesica, P. 1999. Effects of fire on the demography of the endangered, geophytic herb *Silene spaldingii* (Caryophyllaceae). American Journal of Botany. 86: 996-1002.

Lesica, P. and B. Heidel. 1996. Pollination biology of *Silene spaldingii*. Unpublished report to Montana Field Office of The Nature Conservancy. Montana Natural Heritage Program, Helena, MT. 16 p.

Leu, M. and S. E. Hanser. 2011. Influences of the human footprint on sagebrush landscape patterns- implications for sage-grouse conservation. In: Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats Studies in Avian Biology Series (Vol. 38), Knick, S. T. and J. W. Connelly, eds. University of California Press, Berkeley, CA. Pp. 253-271.

Lewis, J., S. R. Mori, E. T. Keppeler and R. R. Ziemer. 2001. Impacts of logging on storm peak flows, flow volumes and suspended sediment loads in Caspar Creek, California. In: Land Use and Watersheds: Human Influence on Hydrology and Geomorphology in Urban and Forest Areas. Water Science and Application, Wigmosta, M. S. and S. J. Burges, eds. American Geophysical Union, Washington, DC. 85-125.

Lind, A. J. 2008. Amphibians and reptiles and climate change. (May 20, 2008). U.S. Department of Agriculture, Forest Service, Climate Change Resource Center, https://www.fs.usda.gov/ccrc/topics/amphibians-reptiles-and-climate-change-2008.

Lindenmayer, D. B., W. F. Laurance, J. F. Franklin, G. E. Likens, S. C. Banks, W. Blanchard, P. Gibbons, K. Ikin, D. Blair, L. McBurney, A. Manning and J. A. R. Stein. 2014. New policies for old trees: Averting a global crisis in a keystone ecological structure. Conservation Letters. 7 (1): 61-69.

Liquori, M. and C. R. Jackson. 2001. Channel response from shrub dominated riparian communities and associated effects on salmonid habitat. Journal of the American Water Resources Association. 37 (6): 1639-1651.

Littell, J. S., M. M. Elsner, L. C. W. Binder and A. K. Snover. 2009a. The Washington Climate Change Impacts Assessment: Evaluating Washington's Future in a Changing Climate - Executive Summary. In: The Washington Climate Change Impacts Assessment: Evaluating Washington's Future in a Changing Climate, Climate Impacts Group, University of Washington, Seattle, Washington. 24 p.

Littell, J. S., D. McKenzie, D. L. Peterson and A. L. Westerling. 2009. Climate and wildfire area burned in western U.S. ecoprovinces, 1916-2003. Ecological Applications. 19 (4): 1003-1021.

Littell, J. S., E. E. Oneil, D. McKenzie, J. A. Hicke and M. M. Elsner. 2009b. Forest Ecosystems, Disturbances, and Climatic Change in Washington State, USA, Chapter 7. In: The Washington Climate Change Impacts Assessment, Littell, J. S., M. M. Elsner, L. C. W. Binder and A. K. Snover, eds. Climate Impacts Group, University of Washington, Seattle, WA. 256-284.

Littell, J. S., E. E. Oneil, D. McKenzie, J. A. Hicke, J. A. Lutz, R. A. Norheim and M. M. Elsner. 2010. Forest ecosystems, disturbance, and climatic change in Washington State, USA. Climatic Change. 102 (1-2): 129-158.

Littell, J. S., D. L. Peterson, K. L. Riley, Y. Liu and C. H. Luce. 2016. A review of the relationships between drought and forest fire in the United States. Global Change Biology. 22 (7): 2353-2369.

Liu, G. and S. Han. 2009. Long-term forest management and timely transfer of carbon into wood products help reduce atmospheric carbon. Ecological Modelling. 220 (13): 1719-1723.

Liu, Y. 2004. Variability of wildland fire emissions across the contiguous United States. Atmospheric Environment. 38: 3489-3499.

Livers, B. and E. E. Wohl. 2015. An evaluation of stream characteristics in glacial versus fluvial process domains in the Colorado Front Range. Geomorphology. 231: 72-82.

Loft, E. R., J. W. Menke, J. G. Kie and C. B. Ron. 1987. Influence of cattle stocking rate on the structural profile of deer hiding cover. Journal of Wildlife Management. 51 (3): 655-664.

Logan, J. A., J. Régnière and J. A. Powell. 2003. Assessing the impacts of global warming on forest pest dynamics. Frontiers in Ecology and the Environment. 1 (3): 130-137.

Long, J. N. 1985. A practical approach to density management. Forestry Chronicle. 61 (1): 23-27.

Long, J. N. 2009. Emulating natural disturbance regimes as a basis for forest management: A North American view. Forest Ecology and Management. 257 (9): 1868-1873.

Long, R. A., J. L. Rachlow and J. G. Kie. 2008. Effects of season and scale on response of elk and mule deer to habitat manipulation. Journal of Wildlife Management. 72 (5): 1133-1142.

Lowell, E. C., S. A. Willits and R. L. Krahmer. 1992. Deterioration of fire-killed and fire-damaged timber in the Western United States. General Technical Report PNW-GTR-292. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 27 p.

Luce, C. 2018. Effects of climate change on snowpack, glaciers, and water resources in the Northern Rockies. In: Climate Change and Rocky Mountain Ecosystems, Advances in Global Change Research, vol. 63, Halofsky, J. and D. Peterson, eds. Springer, Cham. 25-36.

Luce, C., B. Staab, M. Kramer, S. Wenger, D. Isaak and C. McConnell. 2014. Sensitivity of summer stream temperatures to climate variability in the Pacific Northwest. Water Resources Research. Early View

Luce, C. H. 1997. Effectiveness of road ripping in restoration infiltration capacity of forest roads. Restoration Ecology. 5 (3): 265–270.

Luce, C. H., J. T. Abatzoglou and Z. A. Holden. 2013. The missing mountain water: slower westerlies decrease orographic enhancement in the Pacific Northwest USA. Science. 342 (6164): 1360-1364.

Luce, C. H. and Z. A. Holden. 2009. Declining annual streamflow distributions in the Pacific Northwest United States, 1948–2006. Geophysical Research Letters. 36 (L16401): doi:10.1029/2009GL039407.

Luce, C. H., B. E. Rieman, J. B. Dunham, J. L. Clayton, J. G. King and T. A. Black. 2001. Incorporating aquatic ecology into decisions on prioritization of road decommissioning. Water Resources Impact. 3 (3): 8-14.

Luzier, C. W., H. A. Schaller, J. K. Brostom, C. Cook-Tabor, D. H. Goodman, R. D. Nelle, K. Ostrand and B. Streif. 2011. Pacific lamprey (*Entosphenus tridentatus*) assessment and template for conservation measures. U.S. Fish and Wildlife Service, Portland, OR. 282 p.

Lyman, R. L. and S. Wolverton. 2002. The late prehistoric-early historic game sink in the Northwestern United States. Conservation Biology. 16: 73-85.

Lynch, D. L. 2001. Financial results of ponderosa pine forest restoration in southwestern Colorado, Vance, R. K., C. B. Edminster, W. W. Covington and J. A. Blake, eds. Ponderosa pine ecosystems restoration and conservation: steps toward stewardship, Proceedings RMRS-P-22, Flagstaff, UR, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ogden, UT, 141-148.

Lyon, A. G. and S. H. Anderson. 2003. Potential gas development impacts on sage grouse nest initiation and movement. Wildlife Society Bulletin. 31 (2): 486-491.

M

MacDonald, C., S. Buttrick and M. Schindel. 2005. The condition of Oregon's Forests and woodlands: implications for the effective conservation of biodiversity.

MacDonald, L. H. and D. Coe. 2008. Road sediment production and delivery: Processes and management, Proceedings of the first world landslide forum, international programme on landslides and international strategy for disaster reduction, United Nations University, Tokyo, 11 p.

MacDonald, L. H. and E. L. Huffman. 2004. Post-fire soil water repellency: Persistence and soil moisture thresholds. Soil Science Society of America Journal. 68: 1729-1734.

MacDonald, L. H. and J. D. Stednick. 2003. Forest and water: a state-of-the-art review for Colorado. CWRRI Completion Report No. 196. Colorado Water Resources Research Institute, Colorado State University, Fort Collins, Colorado. 65 pp.

Machtans, C. S., M. A. Villard and S. J. Hannon. 1996. Use of riparian buffer strips as movement corridors by forest birds. Conservation Biology. 10 (5): 1366-1379.

Mack, R. and J. N. Thompson. 1982. Evolution in steppe with few large, hooved mammals. American Naturalist. 119 (6): 757-773.

Maclauchlan, L. and J. E. Brooks. 2009. Influence of past forestry practices on western spruce budworm defoliation and associated impacts in southern British Columbia. Journal of Ecosystems and Management. 10 (2): 37-49.

Magoun, A. J. and J. P. Copeland. 1998. Characteristics of wolverine reproductive den sites. The Journal of Wildlife Management. 62 (4): 1313-1320.

Magoun, A. J., P. Valkenburg, C. D. Long and J. K. Long. 2011. Monitoring wolverines in northeast Oregon-2011. Final Report. The Wolverine Foundation, Kuna, Idaho. 32 p.

Mahoney, J. M. and S. B. Rood. 1998. Streamflow requirements for cottonwood seedling recruitment - an integrative model. Wetlands. 18 (4): 634-645.

Maloney, S. B., A. R. Tiedemann, D. A. Higgins, T. M. Quigley and D. B. Marx. 1999. Influence of stream characteristics and grazing intensity on stream temperatures in eastern Oregon. General Technical Report, PNW-GTR-459. USDA Forest Service, Pacific Northwest Research Station, Portland, Oregon. 19 pp.

Manley, P. N., B. Van Horne, J. K. Roth, W. J. Zielinski, M. M. McKenzie, T. J. Weller, F. W. Weckerly and C. Vojta. 2006. Multiple species inventory and monitoring technical guide. U.S. Department of Agriculture, Forest Service, Washington Office, Washington, DC. 204 p.

Manning, M. E., S. R. Swanson, T. Svejcar and J. Trent. 1989. Rooting characteristics of four intermountain meadow community types. Journal of Range Management. 42 (4): 309-312.

Marcot, B. G., R. S. Holthausen, M. G. Raphael, M. M. Rowland and M. J. Wisdom. 2001. Using Bayesian belief networks to evaluate fish and wildlife population viability under land management alternatives from an environmental impact statement. Forest Ecology and Management. 153 (1-3): 29-42.

Marlier, M. E., M. Xiao, R. Engel, B. Livneh, J. T. Abatzoglou and D. P. Lettenmaier. 2017. The 2015 drought in Washington State: a harbinger of things to come? Environmental Research Letters. 12 (11): DOI: 10.1088/1748-9326/aa8fde.

Marré, A. W. 2014. College education in the post-recession rural economy. Choices. 29 (2): 1-5.

Marston, R. A. 1994. River entrenchment in small mountain valleys of the western USA; influence of beaver, grazing and clearcut logging. Revue de Geographie de Lyon. 69 (1): 1-15.

Martin, J. and P. Glick. 2008. A great wave rising: Solutions for Columbia and Snake River salmon in the age of global warming. Light in the River.

Martin, W. B. 1996. Respiratory infections of sheep. Comparative Immunology, Microbiology and Infectious Diseases. 19 (3): 171-179.

Maruoka, K. R. 1994. Fire history of *Pseudotsuga menziesii* and *Abies grandis* stands in the Blue Mountains of Oregon and Washington. M.S. thesis, University of Washington, Seattle, WA.

Mason, B. and B. Countryman. 2010. CVS inventory plot snag and down wood data for the Blue Mountains forest plan revision. Unpublished paper on file at: U.S. Department of Agriculture Forest Service, Wallowa-Whitman National Forest, Blue Mountain Forest Plan Revision Team, Baker City, OR. 25 p.

Massong, T. M. and D. R. Montgomery. 2000. Influence of sediment supply, lithology, and wood debris on the distribution of bedrock and alluvial channels. Geological Society of America Bulletin. 112 (4): 591-599.

Mattson, D. J., K. C. Kendall and D. P. Reinhart. 2001. Whitebark pine, grizzly bears, and red squirrels. . In: Whitebark pine communities: Ecology and restoration, Island Press, 16.

May, B. E., B. J. Writer and S. Albeke. 2012. Redband trout update summary 2012. Wild Trout Enterprises, LLC, Bozeman, MT.

May, R., A. Landa, J. van Dijk, J. D. C. Linnell and R. Andersen. 2006. Impact of infrastructure on habitat selection of wolverines *Gulo gulo*. Wildlife Biology. 12 (3): 285-295.

Mazurek, M. J. and W. J. Zielinski. 2004. Individual legacy trees influence vertebrate wildlife diversity in commercial forests. Forest Ecology and Management. 193 (3): 321-334.

McCabe, G. J. and D. M. Wolock. 2009. Recent declines in western U.S. snowpack in the context of twentieth-century climate variability. Earth Interactions. 13 (12): 1-15.

McCaffery, M., T. A. Switalski and L. Eby. 2007. Effects of road decommissioning on stream habitat characteristics in the South Fork Flathead River, Montana. Transactions of the American Fisheries Society. 136 (3): 553-561.

McCashion, J. D. and R. M. Rice. 1983. Erosion on logging roads in northwestern California: how much is avoidable? Journal of Forestry. 81 (1): 23-26.

McElhany, P., M. H. Ruckelshaus, M. J. Ford, T. C. Wainwright and E. P. Bjorkstedt. 2000. Viable salmonid populations and the recovery of evolutionary significant units. NOAA Technical Memorandum NMFS-NWFSC-42. U.S. Department of Commerce, Seattle, Washington. 156 pp.

McGranahan, D., J. Cromartie and T. Wojan. 2010. The two faces of rural population loss through outmigration. Amber Waves. 8 (4): 38.

McIntosh, B. A. 1992. Historical changes in anadromous fish habitat in the Upper Grande Ronde River, Oregon, 1941-1990 M.S. thesis, Oregon State University, Corvallis, Oregon. 88 p.

McIntosh, B. A., J. R. Sedell, J. E. Smith, R. C. Wissmar, S. E. Clarke, G. H. Reeves and L. A. Brown. 1994. Management history of eastside ecosystems: changes in fish habitat over 50 years, 1935 to 1992. General Technical Report PNW-GTR-321, Volume III. Pacific Northwest Research Station, Portland, Oregon. 55 pp.

McIntosh, B. A., J. R. Sedell, R. F. Thurow, S. E. Clarke and G. L. Chandler. 1995. Historical changes in pool habitats in the Columbia River basin. Report to the Eastside Ecosystem Management Project. Walla Walla, WA. 124 pp.

McIver, J. 1998. Economics and environmental effects of fuel reduction at Limber Jim. Tech Notes. BMNRI-TN-10. Blue Mountains Natural Resources Institute, La Grande, OR. 12 p.

McIver, J., K. Erickson and A. Youngblood. 2012. Principal short-term findings of the national fire and fire surrogate study. General Technical Report PNW-GTR-860. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 210 p.

McIver, J. and R. McNeil. 2006. Soil disturbance and hillslope sediment transport after logging of a severely burned site in northeastern Oregon. Western Journal of Applied Forestry. 21 (3): 123-133.

McIver, J. and L. Starr. 2001. Restoration of degraded lands in the interior Columbia River basin: passive vs. active approaches. Forest Ecology and Management. 153 (1-3): 15-28.

McIver, J. D., P. W. Adams, J. A. Doyal, E. S. Drews, B. R. Hartsough, L. D. Kellogg, C. G. Niwa, R. Ottmar, R. Peck, M. Tarratoot, T. Torgersen and A. Youngblood. 2003. Environmental effects and economics of mechanized logging for fuel reduction in northeastern Oregon mixed-conifer stands. Western Journal of Applied Forestry. 18 (4): 238-249.

McKelvery, K. S., K. Aubry and Y. K. Ortega. 2000. History and distribution of lynx in the contiguous United States. In: Ecology and conservation of lynx in the United States, Ruggiero, L. F., K. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvery and J. R. Squires, eds. University Press of Colorado, Boulder, CO. 207-264.

McKelvey, K. S., J. P. Copeland, M. K. Schwartz, J. S. Littell, K. B. Aubry, J. R. Squires, S. A. Parks, M. M. Elsner and G. S. Mauger. 2011. Climate change predicted to shift wolverine distributions, connectivity, and dispersal corridors. Ecological Applications. 21 (8): 2882-2897.

McKenzie, D., Z. Gedalof, D. L. Peterson and P. Mote. 2004. Climatic change, wildfire, and conservation. Conservation Biology. 18 (4): 890-902.

McKenzie, D., A. E. Hessl and D. L. Peterson. 2001. Recent growth of conifer species of western North American: Assessing spatial patterns of radial growth trends. Canadian Journal Forest Research. 31: 526-538.

McKenzie, D., A. E. Hessl, D. L. Peterson, J. K. Agee, J. F. Lehmkuhl, L.-B. Kellogg and J. Kernan. 2004. Fire and climatic variability in the inland Pacific Northwest: integrating science and management. Final report to the Joint Fire Science Program on Project #01-1-6-01. Joint Fire Science Program, Boise, ID. 44 p.

McKenzie, D., S. M. O'Neill, N. K. Larkin and R. A. Norheim. 2006. Integrating models to predict regional haze from wildland fire. Ecological Modelling. 199 (3): 278-288.

McKinney, E. 1997. It may be utilization, but is it management? Rangelands. 19 (3): 4-7.

McNabb, D. H. and F. J. Swanson. 1990. Effects of fire on soil erosion, chapter 14. In: Natural and prescribed fire in Pacific Northwest forests, Walstad, J. D., ed. Oregon State University Press, Corvallis, OR. 159-176.

Mech, L. D. 1989. Wolf population survival in an area of high road density. The American Midland Naturalist. 121 (2): 387-389.

Meddens, A. J. H., J. A. Hicke and C. A. Ferguson. 2012. Spatiotemporal patterns of observed bark beetle-caused tree mortality in British Columbia and the western United States. Ecological Applications. 22 (7): 1876-1891.

Megahan, W. F. 1972. Subsurface flow interception by a logging road in mountains of central Idaho. In: Watersheds in Transition, Proceedings of a Symposium, Csallany, S. C., T. G. McLaughlin and W. D. Striffler, eds. American Water Resources Association, Fort Collins, Colorado. 350-356.

Megahan, W. F. 1983. Hydrologic effects of clearcutting and wildfire on steep granitic slopes in Idaho. Water Resources Research. 19 (3): 811-819.

Megahan, W. F. and J. L. Clayton. 1983. Tracing subsurface flow on roadcuts on steep, forested slopes. Soil Science Society of America Journal. 47: 1063-1067.

Megahan, W. F., J. P. Potyondy and K. A. Seyedbagheri. 1992. Best management practices and cumulative effects from sedimentation in the South Fork Salmon River: a case study. In: Watershed management, balancing sustainability and environmental change, Naiman, R., ed. Springer-Verlag, New York. 401-414.

Mellen-McLean, K., B. G. Marcot, J. L. Ohmann, K. Waddell, S. A. Livingston, E. A. Willhite, B. B. Hostetler, C. Ogden and T. Dreisbach. 2009. DecAID, the decayed wood advisor for managing snags, partially dead trees, and down wood for biodiversity in forests of Washington and Oregon. Version 2.1. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region and Pacific Northwest Research Station; U.S. Department of Interior, Fish and Wildlife Service, Oregon State Office, Portland, OR.

Mellen-McLean, K., B. Wales and B. Bresson. 2013. A conservation assessment for the white-headed woodpecker (*Picoides albolarvatus*). U.S. Department of Agriculture, Forest Service, Pacific Northwest Region and U.S. Department of INterior, Bureau of Land Management, Portland, OR. 48 p.

Mellina, E., S. G. Hinch and K. D. MacKenzie. 2005. Seasonal movement patterns of stream-dwelling rainbow trout in north-central British Columbia, Canada. Transactions of the American Fisheries Society. 134: 1021-1037.

Merritt, D. M. and E. E. Wohl. 2002. Processes governing hydrochory along rivers: hydraulics, hydrology, and dispersal phenology. Ecological Applications. 12 (4): 1071-1087.

Meurisse, R. T., W. A. Robbie, J. Niehoff and G. Ford. 1990. Dominant soil formation processes and properties in western-montane forest types and landscapes-some implications for productivity and management, Harvey, A. E. and L. F. Neuenschwander, eds. Proceedings - management and productivity of western-montane forest soils, General Technical Report INT-280, Boise, Idaho, USDA Forest Service, Intermountain Research Station, 7-19.

Michelsen-Correa, S. 2011. Geomorphic response to restoration and disturbance: Grazing, fire, and flooding on the Middle Fork John Day River, OR. M.S. thesis, University of Oregon, Eugene.

Millar, C. I., R. Neilson, D. Batchelet, R. Drapek and J. Lenihan. 2006. Climate change at multiple scales, Chapter 3. In: Forests, Carbon, and Climate Change, Salwasser, H. and M. Cloughesy, eds. Oregon Forest Resources Institute, Oregon State University, Department of Forestry, Corvallis, OR. 30-60.

Millar, C. I. and N. L. Stephenson. 2015. Temperate forest health in an era of emerging megadisturbance. Science. 349 (6250): 823-826.

Miller, M. E., L. H. MacDonald, P. R. Robichaud and W. J. Elliot. 2011. Predicting post-fire hillslope erosion in forest lands of the western United States. International Journal of Wildland Fire. 20: 982-999.

Miller, R. E., J. D. McIver, S. W. Howes and W. B. Gaeuman. 2010. Assessment of soil disturbance in forests of the interior Columbia River basin: a critique. General Technical Report PNW-GTR-811. U. S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 140 p.

Miller, R. F., T. Svejcar and N. E. West. 1994. Implications of livestock grazing in the Intermountain Sagebrush Region: plant composition, Vavra, M., ed. Ecological Implications of Livestock Herbivory in the West, Denver, CO, 101-146.

Mirus, B. B., B. A. Ebel, K. Loague and B. C. Wemple. 2007. Simulated effect of a forest road on near-surface hydrologic response: redux. Earth Surface Processes and Landforms. 32 (1): 126-142.

Mitchell, R. G. 1989. Mixed host strategies for mountain pine beetle control in Oregon, Proceedings: symposium on the management of lodgepole pine to minimize losses to the mountain pine beetle. General Technical Report INT-GTR-262. Kalispell, MT, U.S. Department of Agriculture, Forest Service, Intermountain Research Station (USA), 60-63.

Mitchell, R. J., B. J. Palik and J. M.L. Hunter. 2002. Natural disturbance as a guide to silviculture: preface. Forest Ecology and Management. 155 (1-3): 315-317.

Mitchell, S. R., M. E. Harmon and K. E. B. O'Connell. 2009. Forest fuel reduction alters fire severity and long-term carbon storage in three Pacific Northwest ecosystems. Ecological Applications. 19 (3): 643-655.

Mitsch, W. M. and J. G. Gosselink. 2007. Wetlands, fourth edition. John Wiley & Sons, Hoboken, New Jersey.

Monello, R. J., D. L. Murray and E. F. Cassirer. 2001. Ecological correlates of pneumonia epizootics in bighorn sheep herds. Canadian Journal of Zoology. 79 (8): 1423-1432.

Montgomery, D. R. 1994. Road surface drainage, channel initiation, and slope stability. Water Resources Research. 30 (6): 1925-1932.

Montgomery, D. R. 1999. Process domains and the river continuum. Journal of the American Water Resources Association. 35 (2): 397-410.

Montgomery, D. R. 2002. Valley formation by fluvial and glacial erosion. Geology. 30 (11): 1047-1050.

Montgomery, D. R. and J. M. Buffington. 1993. Channel classification, prediction of channel response, and assessment of channel condition. Report FW-SH10-93-002. University of Washington, Department of Geological Sciences and Quaternary Research Center, Seattle, Washington. 84 pp.

Montgomery, D. R. and J. M. Buffington. 1997. Channel-reach morphology in mountain drainage basins. Geological Society of America Bulletin. 109 (5): 596-611.

Montgomery, D. R., J. M. Buffington, R. D. Smith, K. M. Schmidt and G. Pess. 1995. Pool spacing in forest channels. Water Resources Research. 31 (4): 1097-1105.

Montgomery, D. R. and W. E. Dietrich. 1995. Hydrologic processes in a low-gradient source area. Water Resources Research. 31 (1): 1-10.

Montgomery, D. R. and L. H. MacDonald. 2002. Diagnostic approach to stream channel assessment and monitoring. Journal of the American Water Resources Association. 38 (1): 1-16.

Montgomery, D. R., G. Pess, E. M. Beamer and T. P. Quinn. 1999. Channel type and salmonid spawning distribution and abundance. Canadian Journal of Fisheries and Aquatic Sciences. 56 (3): 377-387.

Moody, J. A. and D. A. Martin. 2001. Initial hydrologic and geomorphic response following a wildfire in the Colorado Front Range. Earth Surface Processes and Landforms. 26 (10): 1049-1070.

Moody, J. A. and D. A. Martin. 2009. Synthesis of sediment yields after wildland fire in different rainfall regimes in the western United States. International Journal of Wildland Fire. 18 (1): 96-115.

Moore, R. D. and S. M. Wondzell. 2005. Physical hydrology and the effects of forest harvesting in the Pacific Northwest: a review. Journal of the American Water Resources Association. 41 (4): 763-784.

Morgan, P. 2004. Back to the future: The value of history in understanding and managing dynamic landscapes. In: Proceedings: views from the ridge- considerations for planning at the landscape scale, Gucinski, H., C. Miner and B. Bittner, eds. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 78-82.

Morgan, P., G. H. Aplet, J. B. Haufler, H. C. Humphries, M. M. Moore and W. D. Wilson. 1994. Historical range of variability: a useful tool for evaluating ecosystem change. Journal of Sustainable Forestry. 2 (1-2): 87-111.

Morris, S. E. and T. A. Moses. 1987. Forest fire and the natural soil erosion regime in the Colorado Front Range. Annals of the American Association of Geographers. 77 (2): 245-254.

Morrison, M. L. and M. G. Raphael. 1993. Modeling the dynamics of snags. Ecological Applications. 3 (2): 322-330.

Mote, P. W. 2003. Trends in temperature and precipitation in the Pacific Northwest during the twentieth century. Northwest Science. 77 (4): 271-282.

Mote, P. W. 2003a. Trends in temperature and precipitation in the Pacific Northwest during the twentieth century. Northwest Science. 77 (4): 271-282.

Mote, P. W. 2003b. Trends in snow water equivalent in the Pacific Northwest and their climatic causes. Geophysical Research Letters. 30 (12): 1601, doi:10.1029/2003GL017258.

Mote, P. W., J. T. Abatzoglou and K. E. Kunkel. 2013. Climate variability and change in the past and the future [Chapter 2]. In: Climate Change in the Northwest: Implications for Our Landscapes, Waters, and Communities, Dalton, M. M., P. W. Mote and A. K. Snover, eds. Island Press, Washington, DC. 26-40.

Mote, P. W., A. F. Hamlet, M. P. Clark and D. P. Lettenmaier. 2005. Declining mountain snowpack in western North America. Bulletin of the American Meteorological Society. 86 (1): 39-49.

Mote, P. W., E. A. Parson, A. F. Hamlet, W. S. Keeton, D. Lettenmaier, N. Mantua, E. L. Miles, D. W. Peterson, D. L. Peterson, R. Slaughter and A. K. Snover. 2003. Preparing for climatic change: the water, salmon, and forests of the Pacific Northwest. Climatic Change. 61 (1-2): 45-88.

Mule Deer Working Group. 2003. Mule deer: Changing landscapes, changing perspectives. Western Association of Fish and Wildlife Agencies, 28 p.

Munther, G. L. 1982. Beaver management in grazed riparian ecosystems (Abstract only), Wiley, R., ed. Proceedings of Rocky Mt. Stream Habitat Management Workshop, Jackson, Wyoming, Wyoming Game and Fish Department,

Murray, M. 2001. Habitat prediction mapping for three rare plants on the Wallowa-Whitman National Forest: *Mirabilis macfarlanei*, *Silene spaldingii*, *Spiranthes diluvialis*. Challenge Cost-share Agreement (No. 00-CS-11061600-28) Report, on file. Wallowa-Whitman National Forest, Baker City, Oregon.

Mutch, R. W., S. F. Arno, J. K. Brown, C. E. Carlson, R. D. Ottmar and J. L. Peterson. 1993. Forest health in the Blue Mountains: a management strategy for fire-adapted ecosystems. General Technical Report PNW-GTR-310. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 14 p.

N

Nagle, G. N. and C. F. Clifton. 2003. Channel changes over 12 years on grazed and ungrazed reaches of Wickiup Creek in eastern Oregon. Physical Geography. 24 (1): 77-95.

Naiman, R. J., T. J. Beechie, L. E. Benda, D. R. Berg, P. A. Bisson, L. H. MacDonald, M. D. O'Connor, P. L. Olson and E. A. Steel. 1992a. Fundamental elements of ecologically healthy watersheds in the Pacific Northwest coastal ecoregion. In: Watershed Management, Balancing Sustainability and Environmental Change, Naiman, R., ed. McGraw-Hill, New York. 127-188.

Naiman, R. J., R. E. Bilby and P. A. Bisson. 2000. Riparian ecology and management in the Pacific coastal rain forest. BioScience. 50 (11): 996-1011.

Naiman, R. J., H. Décamps and M. E. McLain. 2005. Riparia: Ecology, Conservation, and Management of Streamside Communities. Elsevier, New York.

Naiman, R. J., S. R. Elliott, J. M. Helfield and T. C. O'Keefe. 1999. Biophysical interactions and the structure and dynamics of riverine ecosystems: the importance of biotic feedbacks. Hydrobiologia. 410 (0): 79-86.

Naiman, R. J., J. J. Magnuson, D. M. McKnight and J. A. Stanford, eds. 1995. The freshwater imperative: a research agenda. Island Press, Washington, DC. 165 p.

Naiman, R. J., J. M. Mellilo and J. E. Hobbie. 1986. Ecosystem alteration of boreal forest streams by beaver (*Castor canadensis*). Ecology. 67 (5): 1254-1269.

Naiman, R. J., G. Pinay, C. A. Johnston and J. Pastor. 1994. Beaver influences on the long-term biogeochemical characteristics of boreal forest drainage networks. Ecology. 75 (4): 905-921.

National Interagency Fuels, Fire, and Vegetation Technology Transfer Team [NIFTT]. 2010. Landfire Biophysical Settings https://www.landfire.gov/data_overviews.php.

National Marine Fisheries Service. 2015. Status review update for Pacific salmon and steelhead listed under the Endangered Species Act: Pacific Northwest. Northwest Fisheries Science Center, Seattle, WA. 356 p.

National Marine Fisheries Service [NMFS]. 1995. Endangered Species Act - Section 7 Consultation Biological Opinion, Land and Resource Management Plans for the: Boise, Challis, Nez Perce, Payette, Salmon, Sawtooth, Umatilla, and Wallowa-Whitman National Forests, March 1, 1995. National Marine Fisheries Service, Northwest Region, Seattle, WA. 138 p.

National Marine Fisheries Service [NMFS]. 1998. Endangered Species Act - Section 7 Consultation Biological Opinion on Land and Resource Management Plans for National Forests and Bureau of Land Management Resource Areas in the Upper Columbia River Basin and Snake River Basin Evolutionarily Significant Units, June 22, 1998. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northwest Region, Seattle, Washington. 130 p.

National Marine Fisheries Service [NMFS]. 2009. Middle Columbia River steelhead distinct population segment ESA recovery plan. National Marine Fisheries Service, Northwest Region, Seattle, WA.

National Marine Fisheries Service [NMFS]. 2014. Fisheries Off West Coast States; West Coast Salmon Fisheries; Amendment 18 to the Salmon Fishery Management Plan; final rule. Federal Register. 79: 75449-75454.

National Marine Fisheries Service [NMFS]. 2016a. 5-Year Review: Summary & Evaluation of Snake River Sockeye, Snake River Spring-Summer Chinook, Snake River Fall-Run Chinook, Snake River Basin Steelhead. National Marine Fisheries Service, West Coast Region, Portland, OR. 127p.

National Marine Fisheries Service [NMFS]. 2016b. 2016 5-Year Review: Summary & Evaluation of Middle Columbia River Steelhead. National Marine Fisheries Service. National Marine Fisheries Service, West Coast Region, Portland, OR. 73p.

National Renewable Energy Laboratory and U.S. Department of Agriculture [USDA], Forest Service. 2005. Assessing the potential for renewable energy on national forest system lands. Karsteadt, R., D. Dahle, D. Heimiller and T. Nealon. NREL/BK-710-36759. U.S. Department of Energy, Golden, CO. 123 p.

National Research Council. 2002. Riparian areas: functions and strategies for management. National Academy Press, Washington, DC.

Neary, D. G. and J. Leonard. 2015. Wildland fire: Impacts on forest, woodland, and grassland ecological processes. In: Wildland Fires: A Worldwide Reality, Goncalves, A. J. D. and A. J. V. Vieira, eds. Nova, New York. 35-112.

Nelson, M. L., T. E. McMahon and R. F. Thurow. 2002. Decline of the migratory form in bull char, *Salvelinus confluentus*, and implications for conservation. Environmental Biology of Fishes. 64: 321-332.

Nelson, N., C. Clifton, T. Black, C. Luce and S. McCune. 2010. Wall Creek Watershed GRAIP Roads Assessment North Fork John Day Subbasin Umatilla National Forest. U.S. Department of Agriculture Forest Service, Umatilla National Forest, Pendleton, OR. 71 p.

Newbold, J. D., D. C. Erman and K. B. Roby. 1980. Effects of logging on macroinvertebrates in streams with and without buffer strips. Canadian Journal of Fisheries and Aquatic Sciences. 37 (7): 1076-1085.

Newman, L. and J. Sears. 1999. Snowmobile impact on the natural envorinment. Revised by Sara Davies and Sarah Fisher (2000); reviesed by Sarah Palma and Derek Stewart (2008). Vermont Legislative Research Shop, University of Vermont, Burlington, VT.

Niemi, G. J., J. M. Hanowski, A. R. Lima, T. Nicholls and N. Weiland. 1997. A critical analysis on the use of indicator species in management. Journal of Wildlife Management. 61 (4): 1240-1252.

Nilsson, C. and M. Svedmark. 2002. Basic principles and ecological consequences of changing water regimes: riparian plant communities. Environmental Management. 30 (4): 468-480.

North American Bird Conservation Initiative (NABCI). 2010. The state of the birds 2010 report on climate change, United States of America, 2010. U.S. Department of the Interior, Washington, D.C.

North, M., J. Innes and H. Zald. 2007. Comparison of thinning and prescribed fire restoration treatments to Sierran mixed-conifer historic conditions. Canadian Journal Forest Research. 37 (2): 331-342.

Northwest Fisheries Science Center. 2015. Status review update for Pacific salmon and steelhead listed under the Endangered Species Act: Pacific Northwest. Seattle, WA. 356p.

Northwest Power and Conservation Council [NWPCC]. 2004. Lower Mid-Columbia Mainstem Subbasin Plan. Columbia River Basin Fish and Wildlife Program, Portland, OR. 391 p.

Noss, R. F., J. F. Franklin, W. L. Baker, T. Schoennagel and P. B. Moyle. 2006. Managing fire-prone forests in the western United States. Frontiers in Ecology and Environment. 4 (9): 481-487.

O

O'Hara, K. L. and L. M. Nagel. 2006. A functional comparison of productivity in even-aged and multiaged stands: a synthesis for *Pinus ponderosa*. Forest Science. 52: 290-303.

Odion, D. C., C. T. Hanson, A. Arsenault, W. L. Baker, D. A. DellaSala, R. L. Hutto, W. Klenner, M. A. Moritz, R. L. Sherriff, T. T. Veblen and M. A. Williams. 2014. Examining historical and current mixed-severity fire regimes in ponderosa pine and mixed-conifer forests of western North America. PLOS One. 9 (2): 1-14.

O'Donnell, J. A., J. W. Harden, A. D. McGuire and V. E. Romanovsky. 2011. Exploring the sensitivity of soil carbon dynamics to climate change, fire disturbance and permafrost thaw in a black spruce ecosystem. Biogeosciences. 8 (5): 1367-1382.

O'Hara, K. L. 2006. Multiaged forest stands for protection forests: Concepts and applications. Forest Snow and Landscape Research. 80 (1): 45-55.

O'Hara, K. L., P. A. Latham, P. F. Hessburg and B. G. Smith. 1996. A structural classification for inland northwest forest vegetation. Western Journal of Applied Forestry. 11 (3): 97-102.

O'Hara, K. L. and B. S. Ramage. 2013. Silviculture in an uncertain world: utilizing multi-aged management systems to integrate disturbance. Forestry Chronicle. 86 (4): 401-410.

Ojima, D. S., L. R. Iverson, B. L. Sohngen, J. M. Vose, C. W. Woodall, G. M. Domke, D. L. Peterson, J. S. Littell, S. N. Matthews, A. M. Prasad, M. P. Peters, G. W. Yohe and M. M. I. P. Friggens, D.L.; Vose, J.M.; Patel-Weynand, T., eds. Springer: 223-244. 2014. Risk assessment [Chapter 9]. In: Climate change and United States forests, Peterson, D. L., J. M. Vose and T. Patel-Weynand, eds. Springer, Dordrecht, The Netherlands. 223-244.

Oles, K. F. and H. E. Enlows. 1971. Bedrock geology of the Mitchell quadrangle, Wheeler County, Oregon. Oregon Department of Geology and Mineral Industries. Bulletin 72: 99 pp.

Oliver, C. D. and B. C. Larson. 1996. Forest stand dynamics. John Wiley & Sons, Inc., New York.

Olson, D. H., P. D. Anderson, C. A. Frissell, H. W. Welsh, Jr. and D. F. Bradford. 2007. Biodiversity management approaches for stream–riparian areas: Perspectives for Pacific Northwest headwater forests, microclimates, and amphibians Forest Ecology and Management. 246 (1): 81-107.

Olson, D. H. and K. M. Burnett. 2009. Design and management of linkage areas across headwater drainages to conserve biodiversity in forest ecosystems. Forest Ecology and Management. 258 (Supplement 1): S117-S126.

Olson, D. L. 2000. Fire in riparian zones: A comparison of historical fire occurrence in riparian and upslope forests in the Blue Mountains and southern Cascades of Oregon. M.S. thesis, University of Washington, Seattle. 288 pp.

Olson, G. S., E. M. Glenn, R. G. Anthony, E. D. Forsman, J. A. Reid, P. J. Loschl and W. J. Ripple. 2004. Modeling demographic performance of northern spotted owls relative to forest habitat in Oregon. Journal of Wildlife Management. 68 (4): 1039-1053.

Onderka, D. K., S. A. Rawluk and W. D. Wishart. 1988. Susceptibility of Rocky Mountain bighorn sheep and domestic sheep to pneumonia induced by bighorn and domestic livestock strains of *Pasteurella haemolytica*. Canadian Journal of Veterinary Research. 52(4): 439-444.

Ooi, N., J. Laing and J. Mair. 2015. Sociocultural change facing ranchers in the Rocky Mountain West as a result of mountain resort tourism and amenity migration. Journal of Rural Studies. 41: 59-71.

Oregon Climate Change Research Institute [OCCRI], K. D. Dello and P. W. Mote, eds. 2010. Oregon Climate Assessment Report. Oregon Climate Change Research Institute, College of Oceanic and Atmospheric Sciences, Oregon State University, Corvallis, OR. 412 p.

Oregon Department of Environmental Quality. 2012. Water Quality Assessment - Oregon's 2012 Integrated Report Assessment Database and 303(d) List (submitted to U.S. EPA 2014). GIS database accessed October 19, 2015, available at: http://www.deq.state.or.us/wq/assessment/rpt2012/search.asp. Salem, OR.

Oregon Department of Environmental Quality [ODEQ]. 2010. Oregon regional haze plan for implementing Section 308 (40CFR 51.308) of the Regional Haze Rule. State Implementation Plan Revision Adoption of Regional Haze Strategies in Oregon, Adopted by the Environmental Quality Commission June 19, 2009, Revised December 9, 2010. Salem, OR. 224 p.

Oregon Department of Fish and Wildlife [ODFW]. 1989. An evaluation of elk habitat management on the Malheur, Umatilla and Wallow-Whitman National Forests and recommended actions. Oregon Department of Fish and Wildlife, Portland, OR. 36 pages.

Oregon Department of Fish and Wildlife [ODFW]. 2003a. Oregon's bighorn sheep and Rocky Mountain goat management plan. Oregon Department of Fish and Wildlife, Salem, OR. 87 p.

Oregon Department of Fish and Wildlife [ODFW]. 2003b. Oregon's elk management plan. Oregon Department of Fish and Wildlife, Portland, OR. 63 p.

Oregon Department of Fish and Wildlife [ODFW]. 2003c. Oregon's mule deer management plan. Oregon Department of Fish and Wildlife, Portland, OR. 32 p.

Oregon Department of Fish and Wildlife [ODFW]. 2005. Oregon wolf conservation and management plan. Oregon Department of Fish and Wildlife, Salem, OR. 116 p.

Oregon Department of Fish and Wildlife [ODFW]. 2006b. The Oregon Conservation Strategy. Oregon Department of Fish and Wildlife, Salem, OR.

Oregon Department of Forestry, [ODF]. 2017. 25 Year Harvest History. For Oregon in Million Board Feet (Scribner Log Scale). Oregon Department of Forestry, Portland, OR. 1 p.

Oregon Department of Geology and Mineral Industries [DOGAMI]. 1989. Hydrocarbon exploration and occurrences in Oregon. Stewart, R. E., V. C. Newton and D. L. Olmstead. Oil and Gas Investigation 15. State of Oregon, Department of Geology and Mineral Industries, Portland, OR. 78 p.

Oregon Department of Geology and Mineral Industries [DOGAMI]. 2012. Geothermal Information Layer for Oregon (GTILO-2). Available at: http://www.oregongeology.org/sub/gtilo/index.htm. Accessed 26-Mar-2014. Salem, OR.

Oregon Forest Resources Institute [OFRI]. 2010. Federal forestland in Oregon: Coming to terms with active forest management of federal forestland. Portland, OR, 21p.

Orr, E. L. and W. N. Orr. 2000. Geology of Oregon. Kendall-Hunt, Dubuque, Iowa. Fifth edition.

Orr, W. N. 1986. A Norian (Late Triassic) ichthyosaur from the Martin Bridge limestone, Wallowa Mountains, Oregon. In: Geology of the Blue Mountains Region of Oregon, Idaho, and Washington Geologic Implications of Paleozoic and Mesozoic Paleontology and Biostratigraphy, Blue Mountains Province, Oregon and Idaho, U.S. Geological Survey Professional Paper 1435, Vallier, T. L. and H. C. Brooks, eds. Washington, DC. 41-47 +app.

Owen, W. 2010. Best practices for selecting and using management indicator species. Unpublished paper on file at: U.S. Department of Agriculture, Forest Service, Wallowa-Whitman National Forest, Blue Mountain Forest Plan Revision Team, Washington, D.C. 7 p.

P

Page-Dumroese, D. S., M. Jurgensen and T. Terry. 2009. Maintaining soil productivity during forest or biomass to energy thinning harvests in the western United States. Western Journal of Applied Forestry. 25 (1): 5-11.

Parker, R., G. Miller and L. C. Burrill. 1998. Scotch broom: Biology and management in the Pacific Northwest. Pacific Northwest Extension Publication, PNW 103. Oregon State University, University of Idaho, Washington State University, 8 p.

Parker, T. J., K. M. Clancy and R. L. Mathiasen. 2006. Interactions among fire, insects and pathogens in coniferous forests of the interior Western United States and Canada. Agricultural and Forest Entomology. 8 (3): 167-189.

Parry, M. L., O. F. Canziani, J. P. Palutikof, P. J. van der Linden and C. E. Hanson, eds. 2007. Climate Change 2007: Impacts, adaptation and vulnerability, vontribution of working group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK.

Parsons, D. J. and S. H. DeBenedetti. 1979. Impact of fire suppression on a mixed-conifer forest. Forest Ecology and Management. 2: 21-33.

Patric, J. H. 1966. Rainfall interception by mature coniferous forests of southeast Alaska. Journal of Soil and Water Conservation. 21: 229-231.

Paul, E. A. and F. E. Clark. 1996. Soil microbiology and biochemistry. Academic Press, New York.

Pearcy, W. G. 1997. Salmon production in changing ocean domains. In: Pacific salmon and their ecosystems: status and future options, Stouder, D. J., P. A. Bisson and R. J. Naiman, eds. Chapman & Hall, New York. 331-352.

Pechenick, A. M., D. M. Rizzo, L. A. Morrissey, K. M. Garvey, K. L. Underwood and B. C. Wemple. 2014. A multi-scale statistical approach to assess the effects of connectivity of road and stream networks on geomorphic channel condition. Earth Surface Processes and Landforms. 39 (11): 1538-1549.

Pendall, E., S. Bridgham, P. J. Hanson, B. Hungate, D. W. Kicklighter, D. W. Johnson, B. E. Law, Y. Luo, J. P. Megonigal, M. Olsru, M. G. Ryan and S. Wang. 2004. Below-ground process responses to elevated CO2 and temperature: a discusion of observations, measurement methods, and models. New Phytologist. 162: 311-322.

Perry, D. A., P. F. Hessburg, C. N. Skinner, T. A. Spies, S. L. Stephens, A. H. Taylor, J. F. Franklin, B. McComb and G. Riegel. 2011. The ecology of mixed severity fire regimes in Washington, Oregon, and Northern California. Forest Ecology and Management. 262 (5): 703-717.

Petersen, J. H. and J. F. Kitchell. 2001. Climate regimes and water temperature changes in the Columbia River: bioenergetic implications for predators of juvenile salmon. Canadian Journal of Fisheries and Aquatic Sciences. 58: 1831-1841.

Peterson, D. L., J. K. Agee, G. H. Aplet, D. P. Dykstra, R. T. Graham, J. F. Lehmkuhl, D. S. Pilliod, D. F. Potts, R. F. Powers and J. D. Stuart. 2009. Effects of timber harvest following wildfire in western North America. General Technical Report PNW-GTR-776. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 51 p.

Peterson, D. L., M. C. Johnson, J. K. Agee, T. B. Jain, D. McKenzie and E. D. Reinhardt. 2005. Forest structure and fire hazard in dry forests of the Western United States. General Technical Report PNW-GTR-628. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 30 p.

Peterson, D. L., C. I. Millar, L. A. Joyce, M. J. Furniss, J. E. Halofsky, R. P. Neilson and T. L. Morelli. 2011. Responding to climate change on national forests: a guidebook for developing adaptation options. General Technical Report PNW-GTR-855. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 109 p.

Peterson, D. W., B. K. Kerns and E. K. Dodson. 2014. Climate change effects on vegetation in the Pacific Northwest: a review and synthesis of the scientific literature and simulation model projections. General Technical Report PNW-GTR-900. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 183 p.

Pike, R. G. and R. Scherer. 2003. Overview of the potential effects of forest management on low flows in snowmelt-dominated hydrologic regimes. BC Journal of Ecosystems and Management. 3 (1): 1-17.

Plamandon, P. A., T. A. Black and B. C. Goodell. 1972. The role of hydrologic properties of the forest floor in watershed hydrology. In: National Symposium on Watersheds in Transition, American Water Resources Association, Colorado State University, Fort Collins, Colorado. 341-348.

Platts, W. S. 1991. Livestock grazing. In: Influences of forest and rangeland management on salmonid fishes and their habitats, Meehan, W. R., ed. American Fisheries Society, Bethesda, Maryland. 389-423.

Poff, R. J. 1989. Compatibility of timber salvage operations with watershed values. In: Proceedings of the symposium on fire and watershed management, General Technical Report PSW-109, Berg, N. H., ed. U.S. Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley, CA. 150 p.

Poirier, J. 2017. Pacific lamprey 2017 regional implementation plan for the Mid-Columbia Regional Management Unit. U.S. Fish and Wildlife Service, Portland, OR. 19 p.

Pollock, M. M., M. Heim and D. Werner. 2003. Hydrologic and geomorphic effects of beaver dams and their influences on fishes. In: The ecology and management of wood in world rivers, American Fisheries Society Symposium 37, Gregory, S., K. Boyer and A. Gurnell, eds. American Fisheries Society, Bethesda, Maryland. 213-233.

Pollock, M. M. and P. M. Kennard. 1998. A low-risk strategy for preserving riparian buffers needed to protect and restore salmonid habitat in forested watersheds of Washington State. 10,000 Years Institute, Bainbridge Island, Washington. 36 pp.

Pollock, M. M., R. J. Naiman, H. E. Erickson, C. A. Johnston, J. Pastor and G. Pinay. 1995. Beaver as engineers: Influences on biotic and abiotic characteristics of drainage basins. In: Linking species and ecosystems, Jones, C. G. and J. H. Lawton, eds. Chapman & Hall, New York. 117-126.

Polvi, L. E., E. E. Wohl and D. M. Merritt. 2011. Geomorphic and process domain controls on riparian zones in the Colorado Front Range. Geomorphology. 125 (4): 504-516.

Potyondy, J. P. and T. W. Geier. 2011. Watershed condition classification technical guide. FS-978. U.S. Department of Agriculture Forest Service, Washington Office, Washington, D. C. 41 p.

Powell, D. C. 2005. Is satisfactory elk cover sustainable? Umatilla National Forest, Unpublished report. Pendleton, OR. 14 p.

Powell, D. C. 2008. Early livestock grazing in the Blue Mountains. Umatilla National Forest, Pendleton, OR. 6 p.

Powell, D. C. 2011. Fire regimes of the Blue Mountains. White Paper F14-SO-WP-Silv-06. U. S. Department of Agriculture, Forest Service, Pacific Northwest Region, Pendleton, OR. 28 pp.

Powell, D. C. 2012. Range of variation recommendations for dry, moist, and cold forests. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region. Umatilla National Forest, F14-SO-WP-Silv-3.

Powell, D. C., C. G. Johnson, Jr., E. A. Crowe, A. F. Wells and D. K. Swanson. 2007. Potential vegetation hierarchy for the Blue Mountains section of northeastern Oregon, southeastern Washington, and west-central Idaho. General Technical Report, PNW-GTR-709. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 87 p.

Powell, D. C., V. A. Rockwell, J. J. Townsley, J. Booser, S. P. Bulkin, T. H. Martin, B. Obedzinski and F. Zensen. 2001. Forest density management: recent history and trends for the Pacific Northwest Region. R6-NR-TM-TP-05-01. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Portland, OR. 21p.

Prestemon, J. P., K. L. Abt, K. M. Potter and F. H. Koch. 2013. An economic assessment of mountain pine beetle timber salvage in the west. Western Journal of Applied Forestry. 28 (4): 143-153.

Prichard, S. J., D. L. Peterson and K. Jacobson. 2010. Fuel treatments reduce the severity of wildfire effects in dry mixed conifer forest, Washington, USA. Canadian Journal of Forest Research. 40 (8): 1615-1626.

Proffitt, K. M., M. Hebblewhite, W. Peters, N. Hupp and J. Shamhart. 2016. Linking landscape-scale differences in forage to ungulate nutritional ecology. Ecological Applications. 26 (7): 2156-2174.

Pyke, D. C. 2011. Restoring and rehabilitating sagebrush habitats. In: Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats Studies in Avian Biology Series (Vol. 38), Knick, S. T. and J. W. Connelly, eds. University of California Press, Berkeley, CA. Pp. 531-548.

Pyne, S. J. 2010. America's fires: a historical context for policy and practice. Forest History Society, Durham, NC. 93 p.

Q

Quigley, T. M. and S. J. Arbelbide, eds. 1997. An assessment of ecosystem components in the interior Columbia basin and portions of the Klamath and Great Basins. General Technical Report PNW-GTR-405, Four Volumes. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

Quigley, T. M., R. W. Haynes and G. T. Russel, eds. 1996. Integrated scientific assessment for ecosystem management in the interior Columbia basin and portions of the Klamath and Great basins. General Technical Report PNW-GTR-382. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 303 p.

Quigley, T. M., K. M. Lee and S. J. Arbelbide, eds. 1997. Evaluation of EIS alternatives by the science integration team, volume I. General Technical Report PNW-GTR-406. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 1063 p.

R

Radford, J. Q., A. F. Bennett and G. J. Cheers. 2005. Landscape-level thresholds of habitat cover for woodland-dependent birds. Biological Conservation. 124 (3): 317-337.

Raffa, K. F., B. H. Aukema, B. J. Bentz, A. L. Carroll, J. A. Hicke, M. G. Turner and W. H. Romme. 2008. Cross-scale drivers of natural disturbances prone to anthropogenic amplification: The dynamics of bark beetle eruptions. BioScience. 58 (6): 501-517.

Rainville, R., R. White and J. Barbour, eds. 2008. Assessment of timber availability from forest restoration within the Blue Mountains of Oregon, General Technical Report PNW-GTR-752. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 65 p.

Raish, C. and A. M. McSweeney. 2003. Economic, Social, and Cultural Aspects of Livestock Ranching on Española and Canjilon Ranger Districts of the Santa Fe and Carson National Forests: A Pilot Study. US Department of Agriculture, Forest Service, Rocky Mountain Research Station,

Raison, R. J., P. K. Khanna, K. L. Jacobsen, J. Romanya and I. Serrasolses. 2009. Effects of fire on forest nutrient cycles. In: Fire Effects on Soils and Restoration Strategies, Cerdá, A. and P. R. Robichaud, eds. Science Publishers, Oxford, UK. 225-256.

Ramsey, K. R. 2002. Personal observation (intermittent pools, entrapment of juvenile Oncorhynchus mykiss).

Randall-Parker, T. and R. Miller. 2002. Effects of prescribed fire in ponderosa pine on key wildlife habitat components: Preliminary results and a method for monitoring, Jr., L., W. F., P. J. Shea, B. E. Valentine, C. P. Weatherspoon and T. E. Lisle, eds. Proceedings of the Symposium on the Ecology and Management of Dead Wood in Western Forests, Reno, NV, Pacific Southwest Research Station, Forest Service, U.S. Department ofAgriculture, 823-834.

Raphael, M. G., M. J. Wisdom, M. M. Rowland, R. S. Holthausen, B. C. Wales, B. G. Marcot and T. D. Rich. 2001. Status and trends of habitats of terrestrial vertebrates in relation to land management in the interior Columbia River basin. Forest Ecology and Management. 153 (1-3): 63-87.

Rashin, E. B., C. J. Clishe, A. T. Loch and J. M. Bell. 2006. Effectiveness of timber harvest practices for controlling sediment related water quality impacts. Journal of the American Water Resources Association. 42 (5): 1307-1327.

Rasmussen, D. I. and L. A. Griner. 1938. Life history and management studies of the sage grouse in Utah, with special reference to nesting and feeding habits. Transactions of the North American Wildlife Conference. 3: 852-864.

Reeves, G. H. 2006. The aquatic conservation strategy of the Northwest Forest Plan: An assessment after 10 years, Chapter 9. In: Northwest Forest Plan—The First 10 Years (1994-2003): Synthesis of Monitoring and Research Results, Haynes, R. W., B. T. Bormann, D. C. Lee and J. R. Martin, eds. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 181-217.

Reeves, G. H., F. H. Everest and J. D. Hall. 1987. Interactions between redside shiners (*Richardsonius balteatus*) and steelhead trout (*Salmo gairdneri*) in western Oregon: the influence of water temperature. Canadian Journal of Fisheries and Aquatic Sciences. 43: 1521-1533.

Reeves, G. H., B. R. Pickard and K. N. Johnson. 2013. Alternative riparian buffer strategies for matrix lands of BLM western Oregon forests that maintain aquatic ecosystem values. Review Draft.

Reeves, G. H., B. R. Pickard and K. N. Johnson. 2016. An initial evaluation of potential options for managing riparian reserves of the aquatic conservation strategy of the Northwest Forest Plan. General Technical Report PNW-GTR-937. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 97 p.

Rehfeldt, G. E., R. J. Hoff and R. J. Steinhoff. 1984. Geographic patterns of genetic variation in *Pinus monticola*. Botanical Gazette. 145 (2): 229-239.

Reid, E. H., C. G. Johnson, Jr. and W. B. Hall. 1991. Green fescue grassland: 50 years of secondary succession under sheep grazing. R6-F16-SO-0591. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Wallowa-Whitman National Forest, Portland, OR.

Reid, L. M. and T. Dunne. 1984. Sediment production from forest road surfaces. Water Resources Research. 20 (11): 1753-1761.

Reidel, S. P., V. E. Camp, T. L. Tolan, J. D. Kauffman and D. L. Garwood. 2013. Tectonic evolution of the Columbia River flood basalt province. In: The Columbia River Basalt Province, Geological Society of America Special Paper 497, Reidel, S. P., V. E. Camp, M. E. Ross, J. A. Wolff, B. S. Martin, T. L. Tolan and R. E. Wells, eds. Bourlder, CO. 293-324.

Reinhardt, E. D. and N. L. Crookston. 2003. The fire and fuels extension to the forest vegetation simulator. RMRS-GTR-116. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ogden, UT. 209 p.

Reinhardt, E. D., R. E. Keane, D. E. Calkin and J. D. Cohen. 2008. Objectives and considerations for wildland fuel treatment in forested ecosystems of the interior western United States. Forest Ecology and Management. 256 (12): 1997-2006.

Reiss, K. Y., P. Dawson, K. Gallo, D. Konnoff and L. Croft. 2008. Process for determining Forest Service contribution to sustainability and determining key watersheds. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Portland, OR. 150 p.

Reneau, S. L. and W. E. Dietrich. 1987. The importance of hollows in debris flow studies: examples from Marin County, California. In: Debris Flows/Avalanches: Process, Recognition, and Mitigation, Costa, J. E. and G. F. Wieczorek, eds. Geological Society of America, Boulder, Colorado. 165-180.

Reynolds, H. G. 1969. Improvement of deer habitat on southwestern forest lands. Journal of Forestry. 67: 803-805.

Reynolds, K., P. Cunningham, L. Bednar, R. Olson, D. Schmoldt, D. Latham, B. Miller and J. Steffenson. 1996. A knowledge-based information management system for watershed analysis in the Pacific Northwest. AI Applications. 10 (2): 9-22.

Reynolds, K. M. 1999. EMDS users guide (Version 2.0): Knowledge-based decision support for ecological assessment. General Technical Report PNW-GTR-470. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 76 p.

Reynolds, K. M. 2006. EMDS 3.0: A modeling framework for coping with complexity in environmental assessment and planning. Science in China Series E: Technological Sciences. 49 (Supplement 1): 63-75.

Reynolds, K. M., P. F. Hessburg, R. E. Miller and R. T. Meurisse. 2011. Evaluating soil risks associated with severe wildfire and ground-based logging. PNW-GTR-840. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

Reynolds, R. T., A. J. S. Meador, J. A. Youtz, T. Nicolet, M. S. Matonis, P. L. Jackson, D. G. DeLorenzo and A. D. Graves. 2013. Restoring composition and structure in Southwestern frequent-fire forests. General Technical Report RMRS-GTR-310. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO. 76 p.

Richards, A. J. 1997. Plant Breeding Systems, Second Edition. Chapman and Hall, United Kingdom.

Rieman, B. E. and F. W. Allendorf. 2001. Effective population size and genetic conservation criteria for bull trout. North American Journal of Fisheries Management. 21: 756-764.

Rieman, B. E. and D. J. Isaak. 2010. Climate change, aquatic ecosystems, and fishes in the Rocky Mountain West: implications and alternatives for management. General Technical Report RMRS-GTR-250. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO. 46 p.

Rieman, B. E., D. C. Lee and R. F. Thurow. 1997. Distribution, status, and likely future trends of bull trout within the Columbia River and Klamath River Basins. North American Journal of Fisheries Management. 17 (4): 1111-1125.

Rieman, B. E. and J. D. McIntyre. 1993. Demographic and habitat requirements for conservation of bull trout. General Technical Report INT-302. USDA Forest Service, Intermountain Research Station, Ogden, Utah. 38 pp.

Rieman, B. R., D. C. Lee, R. F. Thurow, P. F. Hessburg and J. R. Sedell. 2000. Toward an integrated classification of ecosystems: defining opportunities for managing fish and forest health. Environmental Management. 25 (4): 425-444.

Rieman, R., J. T. Peterson, J. Clayton, P. Howell, R. Thurow, W. Thompson and D. Lee. 2001. Evaluation of potential effects of federal land management alternatives on trends of salmonids and their habitats in the interior Columbia River basin. Forest Ecology and Management. 153 (1-3): 43-62.

Riggs, H. C. and M. G. Wolman. 1990. Introduction. In: Surface Water Hydrology, Geology of North America, Volume O-1, Wolman, M. G. and H. C. Riggs, eds. Geolocial Society of America, Boulder, CO. 1-10.

Risenhoover, K. L., J. A. Bailey and L. A. Wakelyn. 1988. Assessing the Rocky Mountain bighorn sheep management problem. Wildlife Society Bulletin. 16 (3): 346-352.

Ritchie, M. W., C. N. Knapp and C. N. Skinner. 2013. Snag longevity and surface fuel accumulation following post-fire logging in a ponderosa pine dominated forest. Forest Ecology and Management. 287: 113-122.

Road Density Analysis Team. 2002. Land management recommendations related to the value of low road density areas in the conservation of listed salmon, steelhead, and bull trout. A commitment made as part of the Biological Opinions For Chinook Salmon and Steelhead (Snake River and upper Columbia River) and Bull Trout (Columbia and Klamath Rivers-areas not covered by the Northwest Forest Plan). Final Report presented tot he Interagency Implementation Team. 41 pp.

Roberge, J.-M. and P. Angelstam. 2004. Usefulness of the umbrella species concept as a conservation tool. Conservation Biology. 18 (1): 76-85.

Robichaud, P. R. 2000. Fire effects on infiltration rates after prescribed fire in Northern Rocky Mountain forests, USA. Journal of Hydrology. 231-232: 220-229.

Robichaud, P. R. and R. E.Brown. 1999. What happened after the smoke cleared: onsite erosion rates after wildfire in eastern Oregon, Olsen, D. S. and J. P. Potyondy, eds. Wildland Hydrology, Bozeman, MT, American Water Resources Association, 419-426.

Robinson, C. T., U. Uehlinger and G. W. Minshall. 2005. Functional characteristics of wilderness streams twenty years following wildfire. Western North American Naturalist. 65 (1): 1-10.

Robinson, H. S., R. B. Wielgus and J. C. Gwilliam. 2002. Cougar predation and population growth of sympatric mule deer and white-tailed deer. canadian Journal of Zoology. 80 (3): 556-568.

Rocky Mountain Region, Forest Health Protection [RM-FHP]. 2010. Field guide to diseases and insects of the Rocky Mountain Region. Gen. Tech. Rep. RMRS-GTR-241. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO. 336 p.

Roering, J. J. and M. Gerber. 2005. Fire and the evolution of steep, soil-mantled landscapes. Geology. 33 (5): 349-352.

Rogers, P. 1996. Disturbance ecology and forest management: a review of the literature. General Technical Report INT-GTR-336. U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Ogden, UT.

Roloff, G. J. 1997. Habitat potential model for Rocky Mountain elk. J. C. deVos, J., ed. Proceedings of the 1997 deer/elk workshop. Arizona Game and Fish Department, Phoenix, Arizona. 158-175.

Roloff, G. J., S. P. Mealey and J. D. Bailey. 2012. Comparative hazard assessment for protected species in a fire-prone landscape. Forest Ecology and Management. 277: 1-10.

Rood, S. B. and J. M. Mahoney. 1995. River damming and riparian cottonwoods along the Marias River, Montana. Rivers. 5 (3): 195-207.

Root, T. L., J. T. Price, K. R. Hall, S. H. Schneider, C. Rosenzweig and J. A. Pounds. 2003. Fingerprints of global warming on wild animals and plants. Nature. 421 (6918): 57-60.

Rosenberger, A. E., J. B. Dunham, J. M. Buffington and M. S. Wipfli. 2011. Persistent effects of wildfire and debris flows on the invertebrate prey base of rainbow trout in Idaho streams. Northwest Science. 85 (1): 55-63.

Rosgen, D. L. 1994. A classification of natural rivers. Catena. 22 (3): 169-199.

Rosgen, D. L. 1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs, CO.

Rowland, M. M., M. J. Wisdom, B. K. Johnson and J. G. Kie. 2000. Elk distribution and modeling in relation to roads. The Journal of Wildlife Management. 64 (3): 672-684.

Rowland, M. M., M. J. Wisdom, B. K. Johnson and M. A. Penninger. 2004. Effects of roads on elk: implications for management in forested ecosystems. Transactions of the 69th North American Wildlife and Natural Resources Conference, 491-508.

Rowland, M. M., M. J. Wisdom, D. H. Johnson, B. C. Wales, J. P. Copeland and F. B. Edelmann. 2003. Evaluation of landscape models for wolverines in the interior Northwest, United States of America. Journal of Mammalogy. 84 (1): 92-105.

Rudolph, K. M., D. L. Hunter, R. B. Rimler, E. F. Cassirer, W. J. Foreyt, W. J. DeLong, G. C. Weiser and A. C. S. Ward. 2007. Microorganisms associated with a pneumonic epizootic in Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*). Journal of Zoo and Wildlife Medicine. 38 (4): 548-558.

Ruggiero, L., K. McKelvey, J. Squires and W. Block. 2008. Wildlife and climate change. (May 20, 2008). U.S. Department of Agriculture, Forest Service, Climate Change Resource Center, https://www.fs.usda.gov/ccrc/topics/wildlife.

Ruggiero, L. F., G. D. Hayward and J. R. Squires. 1994. Viability analysis in biological evaluations: Concepts of population viability analysis, biological population, and ecological scale. Conservation Biology. 8 (2): 364-372.

Ryan, M. G. and S. R. Archer. 2008. Land Resources: Forests and Arid La. In: The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States, Synthesis and Assessment Product (SAP 4.3), U.S. Climate Change Science Program, 75-120.

Ryan, M. G., M. E. Harmon, R. A. Birdsey, C. P. Giardina, L. S. Heath, R. A. Houghton, R. B. Jackson, D. C. McKinley, J. F. Morrison, B. C. Murray, D. E. Pataki and K. E. Skog. 2010. A synthesis of the science on forests and carbon for U.S. forests. Issues in Ecology. Spring (No. 13): 16 p.

Ryan, R. L. 2005. Social science to improve fuels management: a synthesis of research on aesthetics and fuels management. General Technical Report GTR-NC-261. U.S. Department of Agriculture, Forest Service, North Central Research Station, St. Paul, MN. 58 p.

S

Saab, V., R. Brannon, J. Dudley, L. Donohoo, D. Vanderzanden, V. Johnson and H. Lachowski. 2002. Selection of fire-created snags at two spatial scales by cavity-nesting birds, Laudenslayer, W. F., Jr., P. J. Shea, B. E. Valentine, C. P. Weatherspoon and T. E. Lisle, eds. Proceedings of the symposium on the ecology and management of dead wood in western forests, Reno, NV, U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station, Albany, CA, 835-838.

Saab, V. A. 1998. Effects of recreational activity and livestock grazing on habitat use by breeding birds in cottonwood forests along the South Fork Snake River. USDI Bureau of Land Management, Boise, ID. 56.

Saab, V. A., W. M. Block, R. E. Russell, J. F. Lehmkuhl, L. J. Bate and R. White. 2007. Birds and burns of the interior West: descriptions, habitats, and management in western forests. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 23 p.

Saab, V. A., C. E. Bock, T. D. G. Rich and D. S. Dobkin. 1995. Livestock grazing effects in western North America. In: Ecology and management of neotropical migratory birds: a synthesis and review of critical issues, Martin, T. E. and D. M. Finch, eds. Oxford University Press, New York, NY. 311-353.

Saab, V. A., J. Dudley and W. L. Thompson. 2004. Factors influencing occupancy of nest cavities in recently burned forests. The Condor. 106 (1): 20-36.

Saab, V. A. and J. G. Dudley. 1998. Responses of cavity-nesting birds to stand-replacement fire and salvage logging in ponderosa pine/Douglas-fir forests of southwestern Idaho. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ogden, UT. 17 p.

Saab, V. A., R. E. Russell and J. G. Dudley. 2007. Nest densities of cavity-nesting birds in relation to postfire salvage logging and time since wildfire. The Condor. 109 (1): 97-108.

Saab, V. A., R. E. Russell and J. G. Dudley. 2009. Nest-site selection by cavity-nesting birds in relation to postfire salvage logging. Forest Ecology and Management. 257 (1): 151-159.

Safeeq, M., G. E. Grant, S. L. Lewis, M. G. Kramer and B. Staab. 2014. A hydrogeologic framework for characterizing summer streamflow sensitivity to climate warming in the Pacific Northwest, USA. Hydrology and Earth System Sciences. 18 (3): 3693-3710.

Safranyik, L. and B. Wilson, eds. 2006. The mountain pine beetle: A synthesis of biology, management, and impacts on lodgepole pine. Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre, Victoria, BC. 304 p.

Sala, R. B., J. J. C. III, E. Armesto, J. Berlow, R. Bloomfield, R. Dirzo, E. Huber-Sanwald, L. F. Huenneke, R. B. Jackson, A. Kinzig, R. Leemans, D. M. Lodge, H. A. Mooney, M. Oesterheld, N. L. Poff, M. T. Sykes, B. H. Walker, M. Walker and D. H. Wall. 2000. Global biodiversity scenarios for the year 2100. Science. 287 (5459): 1770-1774.

Salathé, E. P., Jr., A. F. Hamlet, C. F. Mass, S.-Y. Lee, M. Stumbaugh and R. Steed. 2014. Estimates of twenty-first-century flood risk in the Pacific Northwest based on regional climate model simulations. Journal of Hydrometeorology. 15 (5): 1881-1899.

Sally, D. 2000. Why do elk seek shelter? The case against the need for thermal cover. USDA Forest Service, Pacific Northwest Research Station, Portland, OR. 1-5.

Salwasser, H., D. Bosworth and J. Lowe. 1995. Streamlining biological evaluations and conclusions for determining effects to listed, proposed and sensitive species. memo from Regional Foresters, USDA Forest Service, Regions 1, 4, and 6 to Forest Supervisors, Regions 1, 4, and 6, August 17, 1995.

Sambaraju, K. R., A. L. Carroll, J. Zhu, K. Stahl, R. D. Moore and B. H. Aukema. 2012. Climate change could alter the distribution of mountain pine beetle outbreaks in western Canada. Ecography. 35 (3): 211-223.

Samson, F. 2005. A conservation assessment of the northern goshawk, black-backed woodpecker, flammulated owl, and pileated woodpecker in the Northern Region, USDA Forest Service. USDA Forest Service, Northern Region Missoula, Montana, USA. 126 p.

Sando, R. and K. W. Blasch. 2015. Predicting alpine headwater stream intermittency: a case study in the northern Rocky Mountains. Ecohydrology & Hydrobiology. 15 (2): 68-80.

Sappington, J. M., K. M. Longshore and D. B. Thompson. 2007. Quantifying landscape ruggedness for animal habitat analysis: A case study using bighorn sheep in the Mojave Desert. The Journal of Wildlife Management. 71 (5): 1419-1426.

Sarr, D., K. Puettmann, R. Pabst, M. Cornett and L. Arguello. 2004. Restoration ecology: New perspectives and opportunities for forestry. Journal of Forestry. 102 (5): 20-24.

Sasich, J. 2006. Landtype associations of Blue Mountains ecoregion in Oregon and Washington (Malheur, Umatilla, Wallowa-Whitman, and a portion of the Ochoco National Forests). Sassich, J. and R. J. Ottersberg. Based on the work of Robert J. Ottersberg. USDA Forest Service, Pacific Northwest Region, Portland, OR. 114 p.

Sauer, J. R., J. E. Hines and J. Fallon. 2008. The North American Breeding Bird Survey, results and analysis 1966 - 2007. Version 5.15. Laurel, MD USGS Patuxent Wildlife Research Center,

Sauer, J. R., B. G. Peterjohn and W. A. Link. 1994. Observer differences in the North American breeding bird survey. The Auk. 111 (1): 50-62.

Savage, M. and J. N. Mast. 2005. How resilient are southwestern ponderosa pine forests after crown fires? Canadian Journal of Forest Research. 35: 967-977.

Schaetzl, R. J., F. J. J. Krist and B. A. Miller. 2012. A taxonomically based ordinal estimate of soil productivity for landscape-scale analyses. Soil Science. 177 (4): 288-299.

Schmidt, W. 1989. Plant dispersal by motor cars. Vegetatio. 80: 147-152.

Schmitt, C. L. and D. C. Powell. 2005. Rating forest stands for insect and disease susceptibility: a simplified approach. Version 2.0. BMPMSC-05-01. United States Department of Agriculture Forest Service, Pacific Northwest Region, Wallowa-Whitman National Forest, Blue Mountains Pest Management Service Center, La Grande, OR. 20 p.

Schmitt, C. L. and D. C. Powell. 2012. Range of variation recommendations for insect and disease susceptibility. White Paper F14-SO-WP-SILV-22. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Umatilla National Forest & Blue Mountains Pest Management Service Center; La Grande, OR, Pendleton, OR. 16p.

Schmoldt, D. L., D. L. Peterson, R. E. Keane, J. M. Lenihan, D. McKenzie, D. R. Weise and D. V. Sandberg. 1999. Assessing the effects of fire disturbance on ecosystems: a scientific agenda for research and management. General Technical Report PNW-GTR-455. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

Schommer, T. J. and M. Woolever. 2001. A process for finding management solutions to the incompatibility between domestic sheep and bighorn sheep. U.S. Department of Agriculture Forest Service, Washington, DC. 62 p.

Schroeder, M. A., J. R. Young and C. E. Braun. 1999. Greater sage-grouse (*Centrocercus urophasianus*), The Birds of North America Online (A. Poole, Ed.). Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/425. Cornell Lab of Ornithology, Ithaca, NY,

Schwartz, M. K., J. P. Copeland, N. J. Anderson, J. R. Squires, R. M. Inman, K. S. McKelvey, K. L. Pilgrim, L. P. Waits and S. A. Cushman. 2009. Wolverine gene flow across a narrow climatic niche. Ecology. 90 (11): 3222-3232.

Schwartz, O. A., V. C. Bleich and S. A. Holl. 1986. Genetics and the conservation of mountain sheep *Ovis canadensis nelsoni*. Biological Conservation. 37 (2): 179-190.

Scott, D. W. 2001. "Untrammeled," "wilderness character," and the challenges of wilderness preservation. Wild Earth. (Fall/Winter 2001/2002)

Scott, D. W. and C. L. Schmitt. 1996. Forest health on national forest lands in the Blue Mountains, 1990-1996: insects and diseases. Report No. BMZ-96-12. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Blue Mountain Pest Management Zone, Wallowa-Whitman National Forest, Baker City, OR.

Scott, M. L., J. M. Friedman and G. T. Auble. 1996. Fluvial processes and the establishment of bottomland trees. Geomorphology. 14 (4): 327-339.

Sedell, J. R., F. N. Leone and W. S. Duvall. 1991. Water transportation and storage of logs. In: Influence of forest and rangeland management on salmonid fishes and their habitats, Meehan, W. R., ed. American Fisheries Society, Bethesda, Maryland. 325-368.

Sedell, J. R., G. H. Reeves and P. A. Bisson. 1997. Habitat policy for salmon in the Pacific Northwest. In: Pacific Salmon and Their Ecosystems: Status and Future Options, Stouder, D. J., P. A. Bisson and R. J. Naiman, eds. Chapman & Hall, New York. 375-387.

Seidl, R., D. C. Donato, K. F. Raffa and M. G. Turner. 2016. Spatial variability in tree regeneration after wildfire delays and dampens future bark beetle outbreaks. Proceedings of the National Academy of Sciences. 113 (46): 13075-13080.

Shafer, S. L., M. E. Harmon, R. P. Neilson, R. Seidl, B. St. Clair and A. Yost. 2010. The potential effects of climate change on Oregon's vegetation. In: Oregon Climate Assessment Report, Dello, K. D. and P. W. Mote, eds. College of Oceanic and Atmospheric Sciences, Oregon State University, Corvallis, OR. 173-208.

Shakesby, R. A. and S. H. Doerr. 2006. Wildfire as a hydrological and geomorphological agent. Earth-Science Reviews. 74 (3-4): 269-307.

Sharma, R. and R. Hilborn. 2001. Empirical relationships between watershed characteristics and coho salmon (*Oncorhynchus kisutch*) smolt abundance in 14 western Washington streams. Canadian Journal of Fisheries and Aquatic Sciences. 58 (7): 1453-1463.

Shaw, D. C., P. T. Oester and G. M. Filip. 2009. Managing insects and diseases of Oregon conifers. Oregon State University, Extension Service, Corvallis.

Sheley, R. L., B. H. Mullin and P. K. Fay. 1995. Managing riparian weeds. Rangelands. 17 (5): 154-157.

Shirley, D. M. and V. Erickson. 2001. Aspen restoration in the Blue Mountains of northeast Oregon, Shepperd, W. D., D. Binkley, D. L. Bartos, T. J. Stohlgren and L. G. Eskew, eds. Sustaining aspen in western landscapes: Symposium proceedings, Proceedings RMRS-P-18, Grand Junction, CO, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO, 101-116.

Short, J. J. and J. E. Knight. 2003. Fall grazing affects big game forage on rough fescue grasslands. Journal of Range Management. 56 (3): 213-217.

Silflow, R., W. Foreyt and R. Leid. 1993. *Pasteurella haemolytica* cytotoxin-dependent killing of neutrophils from bighorn and domestic sheep. Journal of Wildlife Diseases. 29 (1): 30-35.

Simberloff, D. and J. Cox. 1987. Consequences and costs of conservation corridors. Conservation Biology. 1 (1): 63-71.

Simberloff, D., J. A. Farr, J. Cox and D. W. Mehlman. 1992. Movement corridors: Conservation bargains or poor investments? Conservation Biology. 6 (4): 493-504.

Simmons, E., T. Morgan, E. Berg, S. Hayes and G. Christensen. 2016. Logging utilization in Oregon and Washington, 2011-2015 (Resour. Bull. PNW-RB-268). Portland, OR: US Department of Agriculture, Forest Service. Pacific Northwest Research Station. 24 p.

Singer, F. J., M. E. Moses, S. Bellew and W. Sloan. 2000a. Correlates to colonizations of new patches by translocated populations of bighorn sheep. Restoration Ecology. 8 (4S): 66-74.

Singer, F. J., C. M. Papouchis and K. K. Symonds. 2000b. Translocations as a tool for restoring populations of bighorn sheep. Restoration Ecology. 8 (4S): 6-13.

Singer, F. J., E. Williams, M. W. Miller and L. C. Zeigenfuss. 2000c. Population growth, fecundity, and survivorship in recovering populations of bighorn sheep. Restoration Ecology. 8 (4S): 75-84.

Singer, F. J., L. C. Zeigenfuss and L. Spicer. 2001. Role of patch size, disease, and movement in rapid extinction of bighorn sheep. Conservation Biology. 15 (5): 1347-1354.

Singleton, P. 2002. Landscape permeability for forest carnivores in Oregon (Peer Review Draft-8/22/2002). USFS PNW Research Station, Wenatchee Forestry Sciences Lab, Wenatchee, WA. 34 p.

Singleton, P. H., W. L. Gaines and J. F. Lehmkuhl. 2002. Landscape permeability for large carnivores in Washington: a geographic information system weighted-distance and least-cost corridor assessment. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 89 p.

Skinner, C. N. 1995. Change in spatial characteristics of forest openings in the Klamath Mountains of northwestern California, USA. Landscape Ecology. 10 (4): 219-228.

Skinner, C. N. 2002. Influence of fire on dead woody material in forests of California and southwestern Oregon, Laudenslayer, W. F., Jr., P. J. Shea, B. E. Valentine, C. P. Weatherspoon and T. E. Lisle, eds. Proceedings of the symposium on the ecology and management of dead wood in western forests, General Technical Report PSW-GTR-181, Reno, NV, U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station, 445-454.

Skovlin, J. 1991. Fifty years of research progress: a historical document on the Starkey Experimental Forest and Range. General Technical Report PNW-GTR-266. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 54 p.

Skovlin, J. M., P. J. Edgerton and R. W. Harris. 1968. The influence of cattle management on deer and elk. Transactions of the North American Wildlife and Natural Resources Conference. 33: 169-181.

Skovlin, J. M., R. W. Harris, G. S. Strickler and G. A. Garrison. 1976. Effects of cattle grazing methods on ponderosa pine-bunchgrass range in the Pacific Northwest. Technical Bulletin 1531. U.S. Department of Agriculture, Forest Service, Washington, DC. 40 p.

Skovlin, J. M., G. S. Strickler, J. L. Peterson and A. W. Sampson. 2001. Interpreting landscape change in high mountains of northeastern Oregon from long-term repeat photography. General Technical Report PNW-GTR-505. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

Skovlin, J. M. and J. W. Thomas. 1995. Interpreting long-term trends in Blue Mountain ecosystems from repeat photography. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

Slaughter, C. W., D. Marks, G. N. Flerchinger, S. S. V. Vactor and M. Burgess. 2001. Thirty-five years of research data collection at the Reynolds Creek Experimental Watershed, Idaho, United States. Water Resources Research. 37 (11): 2819-2823.

Smith, A. H. and W. E. Martin. 1972. Socioeconomic behavior of cattle ranchers, with implications for rural community development in the West. American Journal of Agricultural Economics. 54 (2): 217-225.

Smith, D. M., B. C. Larson, M. J. Kelty and P. M. S. Ashton, eds. 1997. The practice of silviculture: Applied forest ecology. Wiley, 537 p.

Smith, F. W. and J. N. Long. 1987. Elk hiding and thermal cover guidelines in the context of lodgepole pine stand density. Western Journal of Applied Forestry. 21 (1): 6-10.

Smith, J. 2013. Snowmobiles stress wildlife in winter. Winter Wildlands, Road-RIPorter 1.4.

Smith, J. E., L. A. Kluber, T. N. Jennings, D. McKay, G. Brenner and E. W. Sulzman. 2017. Does the presence of large down wood at the time of a forest fire impact soil recovery? Forest Ecology and Management. 391: 52-62.

Snake River Salmon Recovery Board. 2005 (updated 2011). Snake River Salmon Recovery Plan for Southeast Washington. Appendix B, In: National Marine Fisheries Service. 2016. ESA Snake River Spring/Summer Chinook Salmon and Snake River Basin Steelhead Recovery Plan. National Marine Fisheries Service, West Coast Regional Office, Portland, OR. 598 p.

Snodgrass, J. W. 1997. Temporal and spatial dynamics of beaver created patches as influenced by management practices in a southeastern North American landscape. Journal of Applied Ecology. 34 (4): 1043-1056.

Snyder, D. T. and J. V. Haynes. 2010. Groundwater conditions during 2009 and changes in groundwater levels from 1984 to 2009, Columbia Plateau regional aquifer system, Washington, Oregon, and Idaho. Idaho Scientific Investigations Report 2010–5040. U.S. Department of Interior, U.S. Geological Survey, Reston, VA. 12 p.

Solley, W. B., R. R. Pierce and H. A. Perlman. 1998. Estimated use of water in the United States in 1995. U.S. Geological Survey Circular 1200. U.S. Geological Survey, Washington, DC. 71 p.

Sosa-Pérez, G. and L. H. MacDonald. 2017. Reductions in road sediment production and road-stream connectivity from two decommissioning treatments. Forest Ecology and Management. 398 (15 August): 116-129.

Soulé, M. E. 1987. Viable populations for conservation. Cambridge University Press, Cambridge, UK.

Spencer, W. D., P. Beier, K. Penrod, K. Winters, C. Paulman, H. Rustigian-Romsos, J. Strittholt, M. Parisi and A. Pettler. 2010. California essential habitat connectivity project: a strategy for conserving a connected California. Available from http://www.dfg.ca.gov/habcon/connectivity. Prepared for California Department of Transportation, California Department of Fish and Game, and Federal Highways Administration,

Spies, T. A. 2004. Ecological concepts and diversity of old-growth forests. Journal of Forestry. 102 (3): 14-20.

Spies, T. A., T. W. Giesen, F. J. Swanson, J. F. Franklin, D. Lach and K. N. Johnson. 2010. Climate change adaptation strategies for federal forests of the Pacific Northwest, USA: ecological, policy, and socio-economic perspectives Landscape Ecology. 10.1007/s10980-010-9483-0.

Spies, T. A., M. A. Hemstrom, A. Youngblood and S. Hummel. 2006. Conserving old-growth forest diversity in disturbance-prone landscapes. Conservation Biology. 20 (2): 351-362.

Spraker, T. R., J. K. Collins, W. J. Adrian and J. H. Otterman. 1986. Isolation and serologic evidence of a respiratory syncytial virus in bighorn sheep from Colorado. Journal of Wildlife Diseases. 22 (3): 416-418.

Squires, J. R., J. P. Copeland, T. J. Ulizio, M. K. Schwartz and L. F. Ruggiero. 2007. Sources and patterns of wolverine mortality in western Montana. The Journal of Wildlife Management. 71 (7): 2213-2220.

Srikumaran, S., C. L. Kelling and A. Ambagala. 2007. Immune evasion by pathogens of bovine respiratory disease complex. Animal Health Research Reviews. 8 (02): 215-229.

Stanford, J. A. 1998. Rivers in the landscape: introduction to the special issue on riparian and groundwater ecology. Freshwater Biology. 40 (3): 402-406.

Steel, E. A., B. E. Feist, D. Jenson, G. R. Pess, M. B. Sheer, J. Brauner and R. E. Bilby. 2004. Landscape models to understand steelhead (*Oncorhynchus mykiss*) distribution and help prioritize barrier removals in the Willamette Basin, OR, U.S.A. Canadian Journal of Fisheries and Aquatic Sciences. 61: 999–1011.

Stephens, S. L., J. J. Moghaddas, C. Edminster, C. E. Fiedler, S. Haase, M. Harrington, J. E. Keeley, E. E. Knapp, J. D. McIver, K. Metlen, C. N. Skinner and A. Youngblood. 2009. Fire treatment effects on vegetation structure, fuels, and potential fire severity in western U.S. forests. Ecological Applications. 19 (2): 305-320.

Stewart, I. T. 2009. Changes in snowpack and snowmelt runoff for key mountain regions. Hydrological Processes. 23 (1): 78-94.

Stewart, I. T., D. R. Cayan and M. D. Dettinger. 2005. Changes toward earlier streamflow timing across western North America. Journal of Climate. 18 (8): 1136-1155.

Stewart, J. B. 1977. Evaporation from the wet canopy of a pine forest. Water Resources Research. 13 (6): 915-921.

Stine, P., P. Hessburg, T. Spies, M. Kramer, C. J. Fettig, A. Hansen, J. Lehmkuhl, K. O'Hara, K. Polivka, P. Singleton and S. Charnley. 2014. The ecology and management of moist mixed-conifer forests in eastern Oregon and Washington: a synthesis of the relevant biophysical science and implications for future land management. General Technical Report PNW-GTR-897. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 254 p.

Stohlgren, T. J., L. D. Schell and B. V. Heuvel. 1999. How grazing and soil quality affect native and exotic plant diversity in Rocky Mountain grasslands. Ecological Applications. 9 (1): 45-64.

Strand, E., L. Vierling, S. Bunting and P. Gessler. 2009. Quantifying successional rates in western aspen woodlands: current conditions, future predictions. Forest Ecology and Management. 257 (1705-1715)

StreamNet. 2010. Fish distribution GIS layers (all species), available at: https://www.streamnet.org/data/interactive-maps-and-gis-data/. Accessed July 2010 and March 2014. Pacific States Marine Fisheries Commission, Portland, OR.

Stringham, T. K., W. C. Krueger and P. L. Shaver. 2003. State and transition modeling: an ecological process approach. Journal of Range Management. 56 (2): 106-113.

Stromberg, J. and D. Patten. 1992. Mortality and age of black cottonwood stands along diverted and undiverted streams in the eastern Sierra Nevada, California. Madrono. 39 (3): 205-232.

Stromberg, J. C. 2013. Root patterns and hydrogeomorphic niches of riparian plants in the American Southwest. Journal of Arid Environments. 94 (1)

Stuart, S. N., J. S. Chanson, N. A. Cox, B. E. Young, A. S. L. Rodrigues, D. L. Fischman and R. W. Waller. 2004. Status and trends of amphibian declines and extinctions worldwide. Science. 306 (5702): 1783-1786.

Sugden, B. D. and S. W. Woods. 2007. Sediment production from forest roads in western Montana. Journal of the American Water Resources Association. 43 (1): 193-206.

Sugihara, N. G., J. W. Van Wagtendonk and J. Fites-Kaufman. 2006. Fire as an ecological process. In: Fire in California's Ecosystems, Sugihara, N. G., ed. Berkeley, University of California Press. 58-74.

Sullivan, T. E. 1988. Monitoring soil physical conditions on a national forest in eastern Oregon: a case study, Slaughter, C. W. and T. Gasbarro, eds. Proceedings of the Alaska Soil Productivity Workshop, General Technical Report, PNW-GTR-219, Anchorage, Alaska, U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 69-76.

Suring, L. H., W. L. Gaines, B. C. Wales, K. Mellen-McLean, J. S. Begley and S. Mohoric. 2011. Maintaining populations of terrestrial wildlife through land management planning: a case study. Journal of Wildlife Management. 75 (4): 945-958.

Svancara, L. K., R. Brannon J., M. Scott, C. R. Groves, R. F. Noss and R. L. Pressey. 2005. Policy-driven versus evidence-based conservation: A review of political targets and biological needs. BioScience. 55 (11): 989-995.

Swanson, F. J. and C. T. Dyrness. 1975. Impact of clearcutting and road construction on soil erosion by landslides in the western Cascade Range, Oregon. Geology. 3 (7): 393-396.

Swanson, F. J., J. A. Jones, D. O. Wallin and J. H. Cissel. 1994. Natural variability - implications for ecosystem management. In: Ecosystem management: principles and applications, Volume II. Eastside forest ecosystem health assessment, Jensen, M. E. and P. S. Bourgeron, eds. USDA Forest Service, Portland, OR. 80-94.

Swanson, M. E., J. F. Franklin, R. L. Beschta, C. M. Crisafulli, D. A. DellaSala, R. L. Hutto, D. B. Lindenmayer and F. J. Swanson. 2011. The forgotten stage of forest succession: early-successional ecosystems on forest sites. Frontiers in Ecology and Environment. 9 (2): 117-125.

Swanston, D. N. 1991. Natural processes. In: Influences of forest and rangeland management on salmonid fishes and their habitats, Meehan, W. R., ed. American Fisheries Society, Bethesda, Maryland. 139-179.

Swanston, D. N. and F. J. Swanson. 1976. Timber harvesting, mass erosion, and steepland forest geomorphology. In: Geomorphology and Engineering, Coates, D. R., ed. Dowden, Hutchinson, and Ross, Stroudsburg, PA. 199-221.

Swetnam, T. W., C. D. Allen and J. L. Betancourt. 1999. Applied historical ecology: using the past to manage for the future. Ecological Applications. 19 (4): 1189-1206.

Swetnam, T. W., B. E. Wickman, H. G. Paul and C. H. Baisan. 1995. Historical patterns of western spruce budworm and Douglas-fir tussock moth outbreaks in the northern Blue Mountains, Oregon, since A.D. 1700. Research paper PNW-RP-484. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 27 p.

Switalski, T. A., J. A. Bissonette, T. H. DeLuca, C. H. Luce and M. A. Madej. 2004. Benefits and impacts of road removal. Frontiers in Ecology and Environment. 2 (1): 21-28.

T

Tang, S. M. and D. R. Montgomery. 1995. Riparian buffers and potentially unstable ground. Environmental Management. 19 (5): 741-749.

Tappeiner, J. C., D. A. Maguire and T. B. Harrington. 2007. Silviculture and ecology of western US forests. Oregon State University Press, Corvallis, OR. 1st.

Tashiro-Vierling, K. 1994. Population trends and ecology of the Lewis' woodpecker (*Melanerpes lewis*) in southeastern Colorado. M.A. Thesis, University of Colorado, Boulder, CO. 73 p.

Taylor, A. R. and R. L. Knight. 2003. Wildlife responses to recreation and associated visitor perceptions. Ecological Applications. 13 (4): 951-963.

Taylor, E. M. 1960. Geology of the Clarno Basin Mitchell quadrangle, Oregon. M.S. thesis, Oregon State University, Corvallis. 173 p.

Taylor, E. M. 1981. A mafic-dike system in the vicinity of Mitchell, Oregon, and its bearing on the timing of Clarno-John Day volcanism and early Oligocene deformation in central Oregon. Oregon Geology. 43 (8): 107-112.

Taylor, P. D., L. Fahrig, K. Henein and G. Merriam. 1993. Connectivity is a vital element of landscape structure. Oikos. 68 (3): 571-573.

Taylor, R. V. and S. J. DeBano. 2012. Insect pollinators and predators of Spalding's catchfly (*Silene spaldingii*) of the Zumwalt Prairie, Oregon. Report for the U.S. Fish and Wildlife Service USFWS Agreement # F10AC00090.

Taylor, R. V. and H. Schmalz. 2007. Monitoring of Spalding's catchfly across a gradient of cattle stocking rates. The Nature Conservancy, Enterprise, OR.

Tear, T. H., P. Kareiva, P. L. Angermeier, P. Comer, B. Czech, R. Kautz, L. Landon, D. Mehlman, K. Murphy, M. Ruckelshaus, J. M. Scott and G. Wilhere. 2005. How much is enough? The recurrent problem of setting measurable objectives in conservation. BioScience. 55 (10): 835-849.

Tennyson, M. E. 1989. Eastern Oregon-Washington Province. Petroleum exploration play and resource estimates. Unknowns source, 10 p.

Tennyson, M. E. and J. T. Parrish. 1987. Review of geologic framework and hydrocarbon potential of eastern Oregon and Washington. Open File Report 97-450-0. U.S. Geological Survey, Denver, CO. 41 p.

Thiel, R. P. 1985. Relationship between road densities and wolf habitat suitability in Wisconsin. The American Midland Naturalist. 113 (2): 404-407.

Thomas, J. W., ed. 1979. Wildlife habitats in managed forests: the Blue Mountains of Washington and Oregon, Agriculture Handbook No. 553. U.S. Department of Agriculture, Forest Service, Washington, D.C. 512 pp.

Thomas, J. W., H. Black, Jr., R. J. Scherzinger and R. J. Pedersen. 1979c. Deer and elk. In: Wildlife habitats in managed forests-the Blue Mountains of Oregon and Washington, Thomas, J. W., ed. U.S. Gov. Print. Off., Washington, D.C. 104-127.

Thomas, J. W., D. A. Leckenby, M. G. Henjum, R. J. Pedersen and L. D. Bryant. 1988. Habitat-effectiveness index for elk on Blue Mountain winter ranges. USDA Forest Service, Pacific Northwest Research Station, Portland, OR. 28 p.

Thomas, S. A., T. V. Royer, E. B. Snyder and J. C. Davis. 2005. Organic carbon spiraling in an Idaho river. Aquatic Sciences - Research Across Boundaries. 67 (4): 424-433.

Thomas, T. L. and J. K. Agee. 1986. Prescribed fire effects on mixed conifer forest structure at Crater Lake, Oregon. Canadian Journal of Forest Research. 16 (5): 1082-1087.

Thuiller, W., D. M. Richardson and G. F. Midgley. 2007. Will climate change promote alien plant invasions? In: Ecological Studies, Vol. 193, Nentwig, W., ed. Berlin, Berlin. 197-211.

Thurow, R. F., B. E. Rieman, D. C. Lee, P. J. Howell and R. D. Perkinson. 2007. Distribution and status of redband trout in the Interior Columbia River Basin and portions of the Klamath River and Great Basins. , Redband Trout: Resilience and Challenge in a Changing Landscape, Oregon Chapter, American Fisheries Society, 28-46.

Tisdale, E. 1986. Canyon grasslands and associated shrublands of west-central Idaho and adjacent areas. Bulletin No. 40. Forest, Wildlife, and Range Experiment Station, University of Idaho, Moscow, ID. 42 p.

Tobalske, B. W. 1997. Lewis's woodpecker (*Melanerpes lewis*), The Birds of North America Online (A. Poole, Ed.). Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/284. Cornell Lab of Ornithology, Ithaca, NY,

Tohver, I. M., A. F. Hamlet and S.-Y. Lee. 2014. Impacts of 21st-century climate change on hydrologic extreme in the Pacific Northwest region of North America. Journal of the American Water Resources Association. 50 (3): 1-16.

Torgersen, C. E., J. L. Ebersole and D. M. Keenan. 2012. Primer for identifying cold-water refuges to protect and restore thermal diversity in riverine landscapes. Scientific Guidance Handbook 910-C-12-001. U.S. Environmental Protection Agency, Seattle, WA. 90 p.

Torgersen, C. E., D. M. Price, H. W. Li and B. A. McIntosh. 1999. Multiscale thermal refugia and stream habitat associations of Chinook salmon in northeastern Oregon. Ecological Applications. 9 (1): 301-319.

Torstenson, W. L. F., J. C. Mosley, T. K. Brewer, M. W. Tess and J. E. Knight. 2006. Elk, mule deer, and cattle foraging relationships on foothill and mountain rangeland. Rangeland Ecology & Management. 59 (1): 80-87.

Torstenson, W. L. F., M. W. Tess and J. E. Knight. 2002. Elk management strategies and profitability of beef cattle ranches. Journal of Range Management. 55 (2): 117-126.

Toweill, D. E., V. Geist, T. Story, K. Carlson, T. Tietz, D. Bryan and M. H. Francis. 1999. Return of royalty: wild sheep of North America. Boone and Crockett Club,

Triepke, F. J., B. J. Higgins, R. N. Weisz, J. A. Youtz and T. Nicolet. 2011. Diameter caps and forest restoration-Evaluation of a 16-inch cut limit on achieving desired conditions. Forestry Report FRR3-16-3. U.S. Department of Agriculture, Forest Service, Southwestern Region, Albuquerque, NM. 32 p.

Troendle, C. A. 1983. The potential for water yield augmentation from forest management in the Rocky Mountain region. Water Resources Bulletin. 19 (3): 359-374.

Troendle, C. A. and R. M. King. 1985. The effect of timber harvest on the Fool Creek watershed 30 years later. Water Resources Research. 21 (12): 1915-1922.

Trombulak, S. C. and C. A. Frissell. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. Conservation Biology. 14 (1): 18-30.

Tubbesing, C., C. Strohm, S. J. DeBano, N. Gonzalez, C. Kimoto and R. V. Taylor. 2014. Insect visitors and pollination ecology of Spalding's catchfly (*Silene spaldingii*) in the Zumwalt Prairie of northeastern Oregon. Natural Areas Journal. 34 (2): 200-211.

Turner, M. G., R. H. Gardner and R. V. O'Neill. 2001. Landscape Ecology in Theory and Practice. Springer, New York.

U

U. S. Department of Agriculture, Forest Service [USDA FS]. 2011a. Watershed condition framework. FS-977. Washington, DC.

U. S. Department of Agriculture, Forest Service [USDA FS]. 2012. Pacific Northwest Region Wilderness Air Quality Plan. Portland, OR. 97 p.

U.S. Department of the Interior, Fish and Wildlife Service. 2010. http://www.fws.gov/wetlands/.

U.S. Bureau of Reclamation. 2013. Final 2012 FCRPS Biological Opinion habitat conditions represented using standardized NOAA limiting factors, Snake River spring/summer Chinook salmon population assessment units and limiting factors. Map # 170601-GR-02C. Upper Grande Ronde Subbasin, Oregon, Available online at: https://www.grmw.org/static/documents/data/assessment_documents/PieMapUpperGrandeRonde_Chinook_XLS_20130530_20130701.pdf, last accessed February 26, 2018. Grande Ronde Model Watershed, La Grande, OR.

U.S. Census Bureau. 2000. https://www.census.gov/data/datasets.2000.html Accessed 2/21/2011. U.S. Census Bureau, Population Division, Washington, D.C.

U.S. Census Bureau. 2010. http://www.census.gov/data/datasets.2010.html Accessed 2/21/2011. U.S. Census Bureau, Population Division, Washington, D.C.

U.S. Census Bureau. 2014. https://www.census.gov/data/datasets.2014.html Accessed Date 4/16/2015. U.S. Census Bureau, Population Division, Washington, DC.

U.S. Department of Agriculture, Forest Service [USDA FS]. 1989. Land and resource management plan, Ochoco National Forest. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Portland, OR.

U.S. Department of Agriculture, Forest Service [USDA FS]. 1990. Soil management. FSM 2550. U.S. Department of Agriculture, Forest Service, Washington Office, Washington D.C.

U.S. Department of Agriculture, Forest Service [USDA FS]. 1990. Land and resource management plan, Malheur National Forest. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Portland, OR.

U.S. Department of Agriculture, Forest Service [USDA FS]. 1990a. Final environmental impact statement Land and Resource Management Plan Malheur National Forest. USDA Forest Service, Pacific Northwest Region, Portland, OR.

U.S. Department of Agriculture, Forest Service [USDA FS]. 1990b. Land and resource management plan, Umatilla National Forest. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Portland, OR.

U.S. Department of Agriculture, Forest Service [USDA FS]. 1990c. Land and resource management plan, Wallowa-Whitman National Forest. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Portland, OR.

U.S. Department of Agriculture, Forest Service [USDA FS]. 1993. Region 6 Interim old growth definition for Douglas-fir series, grand fir/white fir series, interior Douglas fir series, lodgepole pine series, Pacific silver fir series, Ponderosa pine series, Port-Orford-cedar and tanoak (redwood), series subalpine fir series, western hemlock series. U. S. Department of Agriculture, Forest Service, Pacific Northwest Region, Portland, OR. 124 p.

U.S. Department of Agriculture, Forest Service [USDA FS]. 1995. Decision notice and finding of no significant impact for the Inland Native Fish Strategy [INFISH]. U.S. Department of Agriculture, Forest Service, Northern, Intermountain, and Pacific Northwest Regions, Missoula, MT; Ogden, UT; Portland, OR. July 28, 1995.

U.S. Department of Agriculture, Forest Service [USDA FS]. 1995. Oil and gas leasing final environmental impact statement. U.S. Department of Agriculture, Forest Service, Umatilla and Malheur National Forests, Pendleton, OR.

U.S. Department of Agriculture, Forest Service, [USDA FS]. 1995. Decision Notice for the Revised Continuation of Interim Management Direction Establishing Riparian, Ecosystem and Wildlife Standards for Timber Sales. (Eastside Screens), U.S. Department of Agriculture, Forest Service, Region 6: Colville, Deschutes, Fremont, Malheur, Ochoco, Okanogan, Umatilla, Wallowa-Whitman and Winema National Forests in Oregon and Washington. U.S. Department of Agriculture Forest Service, Pacific Northwest Region, Portland, OR. 140 p.

U.S. Department of Agriculture, Forest Service [USDA FS]. 1998. Watershed protection and management. FSM 2520, R-6 Supplement 2500-98-1. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Portland, OR. 6 p.

U.S. Department of Agriculture, Forest Service [USDA-FS]. 2001. 2000 Monitoring and Evalution Report for the National Forests of the Blue Mountains, Malheur, Umatilla, and Wallowa-Whitman National Forest. Pacific Northwest Region, Portland, OR.

U.S. Department of Agriculture, Forest Service [USDA FS]. 2003. Hells Canyon National Recreation Area Comprehensive Management Plan. Final Environmental Impact Statement, Two Volumes. U.S. Department of Agriculture, Forest Service, Wallowa-Whitman National Forest, Baker City, OR.

U.S. Department of Agriculture, Forest Service [USDA-FS]. 2004. National Strategy and Implementation Plan for Invasive Species Management. Report FS-805. Washington, DC.

U.S. Department of Agriculture, Forest Service [USDA-FS]. 2006. Biological assessment for the Peola Range Allotment for the effects on Spalding's catchfly. Wood, J. Report on file. Umatilla National Forest, Pendleton, OR. 22 p.

U.S. Department of Agriculture, Forest Service [USDA FS]. 2006a. Canada lynx conservation agreement; U.S. Forest Service and U.S. Fish and Wildlife Service. USDA Forest Service, Washington, D.C. 13 pages.

U.S. Department of Agriculture, Forest Service [USDA-FS]. 2008. Forest Service strategic framework for responding to climate change, Version 1.0. Washington, D.C. 21 p.

U.S. Department of Agriculture, Forest Service [USDA-FS]. 2008. Invasive Plant Biological Assessment (project BA for Invasive Plants Treatment Project). September 16, 2008. Umatilla and Wallowa-Whitman National Forests, Pendleton and Baker City, OR.

U.S. Department of Agriculture, Forest Service [USDA-FS]. 2011. Western bark beetle strategy: Human safety, recovery and resiliency. U.S. Department of Agriculture, Forest Service, Washington Office, 24p.

U.S. Department of Agriculture, Forest Service [USDA-FS]. 2011. Western bark beetle strategy: Human safety, recovery and resiliency. U.S. Department of Agriculture, Forest Service, Washington, DC. 24 p.

U.S. Department of Agriculture, Forest Service [USDA-FS]. 2011. National Road map for Responding to Climate Change. FS-975b. Washington, DC. 32 p.

U.S. Department of Agriculture, Forest Service [USDA-FS]. 2011. Regional aquatic invasive species strategy and management plan, October 2011. Pacific Northwest Region, Portland, OR.

U.S. Department of Agriculture, Forest Service [USDA-FS]. 2011. Memo from Regional Forester, Pacific Northwest Region, Kent Connaughton, to Forest Supervisors: Update of the Regional Forester's Special Status Species List, December 9, 2011. Pacific Northwest Region, Portland, OR.

U.S. Department of Agriculture, Forest Service [USDA FS]. 2012. Increasing the Pace of Restoration and Job Creation on Our National Forests. Washington, DC. 8 p.

U.S. Department of Agriculture, Forest Service [USDA-FS]. 2014. The Interior Columbia Basin Strategy. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Portland, OR. 25 p.

U.S. Department of Agriculture, Forest Service [USDA FS]. 2014. Draft Environmental Impact Statement, Proposed Revised Land Management Plans for the Malheur, Umatilla, and Wallowa-Whitman National Forests, Volume 2. Chapter 3, Aquatic Species Diversity and Viability. Pacific Northwest Region, Portland, OR. 1-68.

U.S. Department of Agriculture, Forest Service [USDA FS]. 2014. Draft Environmental Impact Statement, Proposed Revised Land Management Plans for the Malheur, Umatilla, and Wallowa-Whitman National Forests, Volume 3. Appendix A. Pacific Northwest Region, Portland, OR. 153-316.

U.S. Department of Agriculture, Forest Service [USDA FS]. 2014. Draft Environmental Impact Statement, Proposed Revised Land Management Plans for the Malheur, Umatilla, and Wallowa-Whitman National Forests, Volume 1. Chapter 3, Air Quality. Pacific Northwest Region, Portland, OR. 249-254.

U.S. Department of Agriculture, Forest Service [USDA-FS]. 2015. Baseline estimates of carbon stocks in forests and harvested wood products for National Forest System Units; Pacific Northwest Region. White Paper. Pacific Northwest Region, Portland, OR. 48 p.

U.S. Department of Agriculture, Forest Service [USDA FS]. 2016. Chapter 2020 - Ecosystem restoration. In: Forest Service Manual FSM 2000, Amendment No. wo-2000-2016-1. U.S. Department of Agriculture, Forest Service, Washington, DC. 9 p.

U.S. Department of Agriculture, [USDA] and U.S. Department of Interior, [USDI]. 2000. Interior Columbia Basin Final Environmental Impact Statement. Interior Columbia Basin Ecosystem Management Project. U.S. Department of Agriculture Forest Service, Pacific Northwest Research Station Boise, ID.

U.S. Department of Agriculture [USDA]. 2005. Aquatic/watershed restoration strategy. Malheur National Forest, John Day, OR. 35 p.

U.S. Department of Agriculture [USDA]. 2005. Pacific Northwest Region Aquatic Restoration Strategy. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Portland, OR. 28 pp.

U.S. Department of Agriculture [USDA]. 2005. Biological Assessment for the USDA Forest Service, Pacific Northwest Region, Invasive Plant Program. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Portland, OR. 452 p. + appendices.

U.S. Department of Agriculture [USDA]. 2005. Preventing and managing invasive plants final environmental impact statement, Vol. 1 and Record of Decision. R6-NR-FHP-PR-02-05. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Portland, OR.

U.S. Department of Agriculture [USDA]. 2008. Aquatic and riparian conservation strategy (ARCS). U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Portland, OR. 49 p.

U.S. Department of Agriculture [USDA]. 2008. Soil quality physical indicators: selecting dynamic soil properties to assess soil function. Soil Quality Technical Note 10. Natural Resources Conservation Service, Soil Quality National Technology Development Team, Greensboro, NC. 5 p.

U. S. Department of Agriculture, Natural Resource Conservation Service, Soil Survey Staff. 2010.

U.S. Department of Agriculture [USDA]. 2010c. Terrestrial species assessments Region 6 forest plan revisions. USDA Forest Service, Pacific Northwest Region, Portland, OR. 34 p.

U.S. Department of Agriculture [USDA]. 2018. Blue Mountains Aquatic and Riparian Conservation Strategy, Malheur, Umatilla and Wallowa-Whitman National Forests. USDA Forest Service, Pacific Northwest Region, 146 p.

U.S. Department of Agriculture [USDA] and U.S. Department of Interior [USDI]. 1995. Decision notice and record of decision: interim strategies for managing anadromous fish-producing watersheds on federal lands in eastern Oregon and Washington, Idaho, and portions of California [PACFISH]. U.S. Department of Agriculture, Forest Service; U.S. Department of Interior, Bureau of Land Management, Portland, OR.

U.S. Department of Agriculture Economic Research Service, [USDA ERS]. 2013. Rural-urban Continium Code. U.S. Department of Agriculture, Economic Research Service, Washington, DC.

U.S. Department of Agriculture Economic Research Service, [USDA ERS]. 2015. County Typology Codes. U.S. Department of Agriculture, Economic Research Service, Washington, DC.

U.S. Department of Agriculture Economic Research Service, [USDA ERS]. 2016. Rural Education at a Glance. U.S. Department of Agriculture, Economic Research Service, Washington, DC.

U.S. Department of Agriculture Forest Service, [USDA FS]. 1996. Dutch Flat Creek, Killamacue Creek, and Rock Creek, wild and scenic river(s) (WSR) study report: environmental impact statement. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Portland, OR.

U.S. Department of Agriculture Forest Service, [USDA FS]. 1997. Wild and Scenic River Study Report and Final Legislative Environmental Impact Statement for Eight Rivers. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Portland, OR.

U.S. Department of Agriculture Forest Service, [USDA FS]. 2006. Recreation Site - Facility Master Planning. Wallowa-Whitman National Forest Proposed 5-Year Program of Work and Programmatic Effects of Implementation

U.S. Department of Agriculture Forest Service, Wallowa-Whitman National Forest, Baker City, OR. 14 p.

U.S. Department of Agriculture Forest Service, [USDA FS]. 2007. Recreation Site - Facility Master Planning. Malheur National Forest Proposed 5-Year Program of Work. U.S. Department of Agriculture Forest Service, Malheur National Forest, John Day, OR. 8 p.

U.S. Department of Agriculture Forest Service, [USDA FS]. 2007. Recreation Facility Analysis. Umatilla National Forest Proposed 5-Year Program of Work. U.S. Department of Agriculture Forest Service, Umatilla National Forest, Pendleton, OR. 28 p.

U.S. Department of Agriculture Forest Service, [USDA FS]. 2014. National Visitor Use Monitoring Survey Results. U.S. Forest Service National Summary Report Data collected Through FY 2014. U.S. Department of Agriculture Forest Service, Washington, DC. 30 p.

U.S. Department of Agriculture Forest Service, [USDA FS]. 2015. Service-Wide Memorandum of Understanding Between The Recreational Aviation Foundation And The USDA, Forest Service, WO. U.S. Department of Agricultre Forest Service, Washington, DC. 9 p.

U.S. Department of Agriculture Forest Service, [USFS]. 2016a. Visitor Use Report, Malheur NF. National Visitor Use Monitoring Data collected FY 2014. United States Department of Agriculture, Forest Service, Region 6, Portland, OR. 47 p.

U.S. Department of Agriculture Forest Service, [USFS]. 2016b. Visitor Use Report, Umatilla NF. National Visitor Use Monitoring Data collected FY 2014. United States Department of Agriculture, Forest Service, Region 6, Portland, OR. 48 p.

U.S. Department of Agriculture Forest Service, [USFS]. 2016c. Visitor Use Report, Wallowa-Whitman NF. National Visitor Use Monitoring Data collected FY 2014. United States Department of Agriculture, Forest Service, Region 6, Portland, OR. 50 p.

U.S. Department of Agriculture Forest Service [USDA FS]. 1992a. Environmental Assessment: Motorized access and travel management, Heppner Ranger District, Morrow, Grant, and Wheeler Counties, Oregon. U.S. Department of Agriculture, Forest Service, Umatilla National Forest, Heppner, OR.

U.S. Department of Agriculture Forest Service [USDA FS]. 1992b. Decision notice and finding of no significant impact: Motorized access and travel management, Grant, Morrow, and Wheeler Counties, Oregon. Umatilla National Forest, Heppner Ranger District, Heppner, OR.

U.S. Department of Agriculture Forest Service [USDA FS]. 1993a. Environmental assessment: Motorozed access and travel management plan. Umatilla National Forest, Pomeroy Ranger District, Asotin, Columbia, and Garfield Counties, Oregon. Umatilla National Forest, Pomeroy Ranger District, Pomeroy, WA.

U.S. Department of Agriculture Forest Service [USDA FS]. 1993b. Environmental Assessment: North Fork John Day motorized access and travel management program, Umatilla National Forest, Grant, Umatilla, and Morrow County. Umatilla National Forest, Pendleton, OR.

U.S. Department of Agriculture Forest Service [USDA FS]. 2010. Connecting people with America's great outdoors, a framework for sustainable recreation. Service, U. S. F.

U.S. Department of Energy, [USDOE] and U.S. Department of Interior, Bureau of Land Management, [USDI BLM]. 2008. Programmatic Environmental Impact Statement, Designation of Energy Corridors on Federal Land in 11 Western States (DOE/EIS-0386). Final Summary. U.S. Department of Energy, Washington, DC.

U.S. Department of Energy [USDOE]. 2003. Assessing the potential for renewable energy on public lands. U.S. Department of Energy and U.S. Department of Interior, Bureau of Land Management.

U.S. Department of Interior [USDI]. 1987. Northern Rocky Mountain wolf recovery plan. U.S. Department of the Interior, Fish and Wildlife Service, Denver, CO. 146 p.

U.S. Department of Interior [USDI]. 2005b. Recovery Outline-contiguous United States distinct population segment of the Canada lynx. US Fish and Wildlife Service, Region 6, Denver, CO. 21 p.

U.S. Department of Interior [USDI]. 2007. Recovery Plan for *Silene spaldingii* (Spalding's Catchfly). U.S. Fish and Wildlife Service, Portland, OR. 186 p.

U.S. Department of Interior [USDI], U.S. Department of Agriculture [USDA], U.S. Department of Energy [USDOE] and Western Governor's Association [WGA]. 2009. Memorandum of Understanding regarding wildlife corridors and crucial habitats. Departments of Agriculture, Energy and Interior and the Western Governors' Association. 15 June 2009. [on-line at: https://www.nature.nps.gov/biology/migratoryspecies/documents/DOICorridorsWildlifeMOU.pdf]. 5 p.

U.S. Environmental Protection Agency, [US EPA]. 2011. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2009. U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency [EPA]. 1998. Interim air quality policy on wildland and prescribed fires. 38 p.

U.S. Environmental Protection Agency [US EPA], U. S. Department of Agriculture, Forest Service [USDA FS], U.S. Centers for Disease Control and Prevention and California Air Resources Board. 2008 (revised May 2016). Wildfire smoke: A guide for public health officials. Lipsett, M. and B. Materna. 76 p.

U.S. Fish and Wildlife Service [USFWS]. 1998. Biological Opinion for the effects to bull trout from continued implementation of land and resource management plans and resource management plans as amended by the interim strategy for managing fish-producing watersheds in eastern Oregon and Washington, Idaho, western Montana, and portions of Nevada (INFISH), and the interim strategy for managing anadromous fish-producing watersheds in eastern Oregon and Washington, Idaho, and portions of California (PACFISH). U.S. Fish & Wildlife Service, Pacific Region, Portland, OR.

U.S. Fish and Wildlife Service [USFWS]. 2000. Endangered and threatened wildlife and plants; determination of threatened status for the contiguous U.S. Distinct Population Segment of the Canada lynx and related rule. Federal Register, Washington, D.C. 16052-16086, 50 CFR Part 17, March 24, 2000.

U.S. Fish and Wildlife Service [USFWS]. 2003. Endangered and threatened wildlife and plants; final rule to reclassify and remove the gray wolf from the list of endangered and threatened wildlife in portions of the conterminous United States; establishment of two special regulations for threatened gray wolves. Federal Register, Washington, D.C. 15803-15875, 50CFR Part 17, April 1, 2003

U.S. Fish and Wildlife Service [USFWS]. 2004. Endangered and Threatened Wildlife and Plants; 90-Day Finding on a Petition To List Three Species of Lampreys as Threatened or Endangered; A Proposed Rule. Federal Register. 69: 77158-77167.

U.S. Fish and Wildlife Service [USFWS]. 2005. Biological Opinion, Joseph Creek rangeland analysis, Lower Grande Ronde subbasin, Wallowa County, Oregon. 1-17-05-F-0640. La Grande, Oregon.

U.S. Fish and Wildlife Service [USFWS]. 2006. Bull trout core area conservation status assessment. Portland, OR. 95p.

U.S. Fish and Wildlife Service [USFWS]. 2008. Bull Trout (*Salvelinus confluentus*) 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Portland, OR, 55 p.

U.S. Fish and Wildlife Service [USFWS]. 2009. Endangered and threatened wildlife and plants; revised designation of critical habitat for the contiguous United States distinct population segment of the Canada lynx; final rule. Federal Register, Washington, D.C. 8615-8702, 50 CFR Part 17, February 25, 2009.

U.S. Fish and Wildlife Service [USFWS]. 2009. Species Fact Sheet. Great Basin redband trout (*Oncorhynchuw mykiss gibbsi*). Online at URL: https://www.fws.gov/oregonfwo/Species/Data/GreatBasinRedbandTrout/. Last accessed June 25, 2011. Pacific Region, Oregon Fish & Wildlife Office, Portland, OR.

U.S. Fish and Wildlife Service [USFWS]. 2010. Best Management Practices to minimize adverse effects to Pacific lamprey (*Entosphenus tridentatus*). Portland, OR. 25p.

U.S. Fish and Wildlife Service [USFWS]. 2012. Conservation Agreement for Pacific Lamprey in the States of Alaska, Washington, Idaho, Oregon and California. U.S. Fish and Wildlife Service, Region 1, Portland, OR. 57 p.

U.S. Fish and Wildlife Service [USFWS]. 2013. Greater Sage-grouse (*Centrocercus urophasianus*) Conservation Objectives: Final Report. Denver, CO. 115 p.

U.S. Fish and Wildlife Service [USFWS]. 2015. Final Bull Trout Recovery Plan. Available at: https://www.fws.gov/pacific/bulltrout/Planning.html. Pacific Region, Portland, OR.

U.S. Fish and Wildlife Service [USFWS]. 2015b. Mid-Columbia recovery unit implementation plan for Bull Trout (*Salvelinus confluentus*). Portland, OR.

U.S. Geological Survey [USGS]. 2008. National assessment of oil and gas project: geologic assessment of undiscovered gas resources of the eastern Oregon and Washington province. Compiled by U.S. Geological Survey eastern Oregon and Washington province assessment team, Digital Data Series DDS-69-0. Reston, VA.

Unsworth, J. W., D. F. Pac, G. C. White and R. M. Bartmann. 1999. Mule deer survival in Colorado, Idaho, and Montana. The Journal of Wildlife Management. 63 (1): 315-326.

V

van Mantgem, P. J., L. B. Lalemand, M. Keifer and J. M. Kane. 2016. Duration of fuels reduction following prescribed fire in coniferous forests of U.S. national parks in California and the Colorado Plateau. Forest Ecology and Management. 379: 265-272.

van Mantgem, P. J., N. L. Stephenson, J. C. Byrne, L. D. Daniels, J. F. Franklin, P. Z. Fule, M. E. Harmon, A. J. Larson, J. M. Smith, A. H. Taylor and T. T. Veblen. 2009. Widespread increase of tree mortality rates in the western United States. Science. 323 (5913): 521-524.

Van Pelt, R. 2008. Identifying old trees and forests in Eastern Washington. Washington State Department of Natural Resources, Olympia, WA. 166 p.

Vavra, M. 1992. Livestock and big game forage relationships. Rangelands. 14 (2): 57-59.

Vavra, M. 2009. Factors influencing cattle, elk, and mule deer distribution in managed forests. Agricultural Experiment Station, Oregon State University, 8-14.

Vavra, M. and R. A. Riggs. 2010. Managing multi-ungulate systems in disturbance-adapted forest ecosystems in North America. Forestry. 83 (2): 177-187.

Vavra, M., K. Walburger and T. DelCurto. 2005. Ungulate ecology of ponderosa pine ecosystems in the Northwest General Technical Report PSW-GTR-198. USDA Forest Service, 145-158.

Veblen, T. T., T. Kitzberger and J. Donnegan. 2000. Climatic and human influences on fire regimes in ponderosa pine forests in the Colorado Front Range. Ecological Applications. 10 (4): 1178-1195.

Verts, B. J. and L. N. Carraway. 1998. Land Mammals of Oregon. University of California Press, Berkeley and Los Angeles, CA.

Vickery, P. D., D. E. Blanco and B. López-Lanús. 2010. Conservation plan for the upland sandpiper (*Bartramia longicauda*). Manomet Center for Conservation Sciences, Manomet, MA. 57 pages.

Vora, R. S. 1988. Potential soil compaction forty years after logging in northeastern California. Great Basin Naturalist. 48 (1): 117-120.

Vose, J. M., C. F. Miniat, C. H. Luce, H. Asbjornsen, P. V. Caldwell, J. L. Campbell, G. E. Grant, D. J. Isaak, S. P. Loheide and G. Sun. 2016. Ecohydrological implications of drought for forests in the United States. Forest Ecology and Management. 380 (Supplement C): 335-345.

Vose, J. M., D. L. Peterson and T. Patel-Weynand, eds. 2012. Effects of climatic variability and change on forest ecosystems: a comprehensive science synthesis for the U.S. General Technical Report PNW-GTR-870. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 265 p.

W

Waananen, A. O., D. D. Harris and R. C. Williams. 1971. Floods of December 1964 and January 1965 in the far western states: Part 1. Description. U.S. Geological Survey, Water-Supply Paper 1866-A. U.S. Department of Interior, Sacramento, California. 265 pp.

Wagenbrenner, J. W. and P. R. Robichaud. 2014. Post-fire bedload sediment delivery across spatial scales in the interior western United States. Earth Surface Processes and Landforms. 39 (7): 865-876.

Wales, B. C., K. Mellen-McClean, W. L. Gaines and L. Suring. 2011. Focal species assessment of current condition and the proposed action (alternative B) for the Blue Mountains forest plan revision-DRAFT. Unpublished paper on file at: U.S. Department of Agriculture Forest Service, Wallowa-Whitman National Forest, Blue Mountain Forest Plan Revision Team, Baker City, OR.

Walker, J. W. and R. K. Heitschmidt. 1986. Effect of various grazing systems on type and density of cattle trails. Journal of Range Management. 39 (5): 428-430.

Walther, G. R., E. Post, P. Convey, A. Menzel, C. Parmesa, T. J. C. BeeBee, J. Fromentin, O. Hoegh-Guldberg and F. Bairlein. 2002. Ecological responses to recent climate change. Nature. 416: 389-395.

Walther, G.-R., A. Roques, P. E. Hulme, M. T. Sykes, P. Pyšek, I. Kühn, M. Zobel, S. Bacher, Z. Botta-Dukát, H. Bugmann, B. Czúcz, J. Dauber, T. Hickler, V. Jarošík, M. Kenis, S. Klotz, D. Minchin, M. Moora, W. Nentwig, J. Ott, V. E. Panov, B. Reineking, C. Robinet, V. Semenchenko, W. Solarz, W. Thuiller, M. Vilà, K. Vohland and J.Settele. 2009. Alien species in a warmer world: risks and opportunities. Trends in Ecology and Evolution. 24 (12): 686-693.

Wambolt, C. L., M. R. Frisina, K. S. Douglass and H. W. Sherwood. 1997. Grazing effects on nutritional quality of bluebunch wheatgrass for elk. Journal of Range Management. 50 (5): 503-506.

Wargo, P. M. and T. C. Harrington. 1991. Host stress and susceptibility. In: Armillaria root disease. USDA Forest Service Agriculture Handbook No. 691, G., S. C. and G. A. Kile, eds. USDA Forest Service Rocky Mountain Forest and Range Experiment Station, Ft. Collins, CO. 88-101.

Waring, R. H. and G. B. Pitman. 1985. Modifying lodgepole pine stands to change susceptibility to mountain pine beetle attack. Ecology. 66 (3): 889-897.

Washington Wildlife Habitat Connectivity Working Group (WHCWG). 2010. Washington connected landscapes project: statewide analysis. Washington Departments of Fish and Wildlife, and Transportation, Olympia, WA. 223 p.

Watson, C. C., D. S. Biedenharn and B. P. Bledsoe. 2002. Use of incised channel evolution models in understanding rehabilitation alternatives. Journal of the American Water Resources Association. 38 (1): 151-160.

Weaver, R. L. 1962. Meteorology of hydrologically critical storms in California. Hydrometeorlogical Report No. 37. U.S. Dept. of Commerce, Weather Bureau, Washington, DC. 207 p. plus appendices.

Weckstein, J. D., D. E. Kroodsma and R. C. Faucett. 2002. Fox sparrow (*Passerella iliaca*), The Birds of North America Online (A. Poole, Ed.) Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/715. Cornell Lab of Ornithology, Ithaca, NY,

Weidman, R. H. and F. A. Silcox. 1936. Timber growing and logging practice in ponderosa pine in the Northwest, U.S. Department of Agriculture, Washington, DC.

Weise, D. R., R. Kimberlin, M. Arbaugh, J. Chew, G. Jones, J. Merzenich, M. Wiitala, R. E. Keane, M. Schaaf and J. Van Wagtendonk. 2003. Comparing potential fuel treatment trade-off models. In: Systems analysis in forest resources: proceedings of the 8th symposium, Arthaud, G. J. and T. M. Barrett, eds. Kluwer Academic Publishers, Dordrecht, The Netherlands, Snowmass Village, CO. 15-25.

Weiser, G., W. DeLong, J. Paz, B. Shafii, W. Price and A. Ward. 2003. Characterization of *Pasteurella multocida* associated with pneumonia in bighorn sheep. Journal of Wildlife Diseases. 39 (3): 536-544.

Wells, A. F. 2006. Deep canyon and subalpine riparian and wetland plant associations of the Malheur, Umatilla, and Wallowa-Whitman National Forests. General Technical Report PNW-GTR-682. U.S. Forest Service, Pacific Northwest Research Station, Portland, Oregon. 277 pp.

Welsh, M. J. 2008. Sediment production and delivery from forest roads and off-highway vehicle trails in the upper South Platte River watershed, Colorado. M.S. thesis, Colorado State University, Fort Collins. 227 p.

Weltzin, J. F., M. E. Loik, S. Schwinning, D. G. Williams, P. A. Fay, B. M. Haddad, J. Harte, T. E. Huxman, A. K. Knapp, G. Lin, W. T. Pockman, M. R. Shaw, E. E. Small, M. D. Smith, S. D. Smith, D. T. Tissue and J. C. Zak. 2003. Assessing the response of terrestrial ecosystems to potential changes in precipitation. BioScience. 53 (10): 941-952.

Wemple, B. C., J. A. Jones and G. E. Grant. 1996. Channel network extension by logging roads in two basins, western Cascades, Oregon. Water Resources Bulletin. 32 (6): 1195-1207.

Wemple, B. C., F. J. Swanson and J. J. Jones. 2001. Forest roads and geomorphic process interactions, Cascade Range, Oregon. Earth Surface Processes and Landforms. 26 (2): 191-204.

Wenger, S. 1999. A review of the scientific literature on riparian buffer width, extent and vegetation. Office of Public Service & Outreach, Institute of Ecology, University of Georgia, Athens, Georgia. 59 pp.

Wenger, S. J., C. H. Luce, A. F. Hamlet, D. J. Isaak and H. M. Neville. 2010. Macroscale hydrologic modeling of ecologically relevant flow metrics. Water Resources Research. 46 (W09513): doi:10.1029/2009WR008839.

Westenskow-Wall, K. J., W. C. Krueger, L. D. Bryant and D. R. Thomas. 1994. Nutrient quality of bluebunch wheatgrass regrowth on elk winter range in relation to defoliation. Journal of Range Management. 47 (3): 240-244.

Westerling, A. L. 2016. Increasing western US forest wildfire activity: sensitivity to changes in the timing of spring. Philosophical Transactions of the Royal Society B: Biological Sciences. 371 (1696)

Westerling, A. L., A. Gershunov, T. J. Brown, D. R. Cayan and M. D. Dettinger. 2003. Climate and wildfire in the western United States. Bulletin of the American Meteorological Society. 84 (5): 595-604.

Westerling, A. L., H. G. Hidalgo, D. R. Cayan and T. W. Swetnam. 2006. Warming and earlier spring increases western U.S. forest wildfire activity. Sciencexpress. (6 July): 1-9.

Westerling, A. L., M. G. Turner, E. A. H. Smithwick, W. H. Romme and M. G. Ryan. 2011. Continued warming could transform Greater Yellowstone fire regimes by mid-21st century. Proceedings of the National Academy of Sciences. 108 (32): 13165-13170.

Western Association of Fish and Wildlife Agencies [WAFWA]. 2010. Recommendations for domestic sheep and goat management in wild sheep habitat. Western Association of Fish and Wildlife Agencies,

Western Forestry Leadership Coalition, [WFLC]. 2010. The True Cost of Wildfire in the Western U.S. Western Forestry Leadership Coalition, Lakewood, CO. 18 p.

Westoby, M., B. Walker and I. Noy-Meir. 1989. Opportunistic management for rangelands not at equilibrium. Journal of Range Management. 42 (4): 266-274.

Wheeler, M. A., M. J. Trlica, G. W. Frasier and J. D. Reeder. 2002. Seasonal grazing affects soil physical properties of a montane riparian community. Journal of Range Management. 55 (1): 49-56.

Whiteley, A. R., K. Hastings, J. K. Wenburg, C. A. Frissell, J. C. Martin and F. W. Allendorf. 2010. Genetic variation and effective population size in isolated populations of coastal cutthroat trout. Conservation Genetics. 11 (5): 1929-1943.

Whitesel, T., J. Brostrom, T. Cummings, J. Delavergne, W. Fredenberg, H. Schaller, P. Wilson and G. Zydlewski. 2004. Bull Trout Recovery Planning: A review of the science associated with population structure and size. Science Team Report# 2004-1. U.S. Fish and Wildlife Service, Regional Office, Portland, OR. 68 p.

Whitlock, C., S. L. Shafer and J. Marlon. 2003. The role of climate and vegetation change in shaping past and future fire regimes in the northwestern US and the implications for ecosystem management. Forest Ecology and Management. 178 (1-2): 5-21.

Wickstrom, M. L., C. T. Robbins, T. A. Hanley, D. E. Spalinger and S. M. Parish. 1984. Food intake and foraging energetics of elk and mule deer. The Journal of Wildlife Management. 48 (4): 1285-1301.

Wiedinmyer, C. and H. Friedli. 2007. Mercury emission estimates from fires: an initial inventory for the United States. Environmental Science & Technology. 41 (23): 8092-8098.

Wiens, J. A., G. D. Hayward, R. S. Holthausen and M. J. Wisdom. 2008. Using surrogate species and groups for conservation planning and management. BioScience. 58 (3): 241-252.

Wilcove, D. S., D. Rothstein, D. Jason, A. Phillips and E. Losos. 1998. Quantifying threats to imperiled species in the United States. BioScience. 48 (8): 607-615.

Wildland Fire Leadership Council [WFLC]. 2014. National cohesive wildland fire management strategy. U.S. Department of Agriculture and U.S. Department of Interior, Washington, DC. 101p.

Wilkinson, C. F. and H. M. Anderson. 1987. Land and Resource Planning in the National Forests. Island Press, Washington, D.C.

Wilkinson, W. D. and K. F. Oles. 1968. Stratigraphy and paleoenvironments of Cretaceous rocks, Mitchell quadrangle, Oregon. American Association of Petroleum Geologists Bulletin. 52 (1): 129-161.

Williams, G. P. and M. G. Wolman. 1984. Downstream effects of dams on alluvial rivers. U.S. Geological Survey Professional Paper 1286. U.S Department of Interior, Washington, DC. 83 pp.

Williams, J. 2013. Exploring the onset of high-impact mega-fires through a forest land management prism. Forest Ecology and Management. 294: 4-10.

Williams, M. A. and W. L. Baker. 2012. Spatially extensive reconstructions show variable-severity fire and heterogeneous structure in historical western United States dry forests. Global Ecology and Biogeography. 21: 1042-1052.

Willms, W., A. McLean, R. Tucker and R. Ritcey. 1980. Deer and cattle diets on summer range in British Columbia. Journal of Range Management. 33 (1): 55-59.

Wilson, B., R. Brainerd, D. Lytjen, B. Newhouse and N. Otting. 2008. Field Guide to the Sedges of the Pacific Northwest. Oregons State University Press, Corvallis. 432 p.

Winkler, R., D. R. Field, A. Luloff, R. S. Krannich and T. Williams. 2007. Social landscapes of the inter-mountain West: A comparison of ‘old West’and ‘new West’communities. Rural Sociology. 72 (3): 478-501.

Winward, A. H. 2000. Monitoring the vegetation resources in riparian areas. USDA Forest Service, General Technical Report, RMRS-GTR-47. Rocky Mountain Research Station, Ogden, Utah. 49 pp.

Wisdom, M. J., A. A. Ager, H. K. Preisler, N. J. Cimon and B. K. Johnson. 2005. Effects of off-road recreation on mule deer and elk. In: The Starkey Project: a synthesis of long-term studies of elk and mule deer. Reprinted from the 2004 Transactions of the North American Wildlife and Natural Resources Conference, Wisdom, M. J., ed. Alliance Communications Group, Lawrence, Kansas. Pages 67-80.

Wisdom, M. J. and L. J. Bate. 2008. Snag density varies with intensity of timber harvest and human access. Forest Ecology and Management. 255 (7): 2085-2093.

Wisdom, M. J., L. Bright, C. Carey, W. Hines, R. Pederson, D. Smithey, J. Thomas and G. Witmer. 1986. A model to evaluate elk habitat in western Oregon. Publication R6–F&WL–216–1986. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Portland, OR.

Wisdom, M. J., N. J. Cimon, B. K. Johnson, E. O. Garton and J. W. Thomas. 2005a. Spatial partitioning by mule deer and elk in relation to traffic. In: The Starkey Project: a synthesis of long-term studies of elk and mule deer. Reprinted from the 2004 Transactions of the North American Wildlife and Natural Resources Conference, Wisdom, M. J., ed. Alliance Communications Group, Lawrence, Kansas. Pages 53-66.

Wisdom, M. J., R. S. Holthausen, B. C. Wales, C. D. Hargis, V. A. Saab, D. C. Lee, W. J. Hann, T. D. Rich, M. M. Rowland, W. J. Murphy and M. R. Eames. 2000. Source habitats for terrestrial vertebrates of focus in the interior Columbia basin: broad-scale trends and management implications. General Technical Report PNW-GTR-485, 3 volumes. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

Wisdom, M. J., C. W. Meinke, S. T. Knick and M. A. Schroeder. 2011. Factors associated with extirpation of sage-grouse. In: Greater sage-grouse: ecology and conservation of a landscape species and its habitats, Knick, S. T. and J. W. Connelly, eds. University of California Press, Berkeley, CA. 451–472.

Wissmar, R. C. 2004. Riparian corridors of eastern Oregon and Washington: Functions and sustainability along lowland-arid to mountain gradients. Aquatic Sciences - Research Across Boundaries. 66 (4): 373-387.

Wissmar, R. C., J. E. Smith, B. A. McIntosh, H. W. Li, G. H. Reeves and J. R. Sedell, eds. 1994. Ecological health of river basins in forested regions of eastern Washington and Oregon. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, Oregon. 65 pp.

With, K. A. and T. O. Crist. 1995. Critical thresholds in species' responses to landscape structure. Ecology. 76 (8): 2446-2459.

Witmer, G. W., S. K. Martin and R. D. Sayler. 1998. Forest carnivore conservation and management in the interior Columbia basin: issues and environmental correlates. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 51 p.

Wondzell, S. M. 2001. The influence of forest health and protection treatments on erosion and stream sedimentation in forested watersheds of eastern Oregon and Washington. Northwest Science. 75 (Special Issue): 128-140.

Wondzell, S. M. and J. G. King. 2003. Postfire erosional processes in the Pacific Northwest and Rocky Mountain regions. Forest Ecology and Management. 178 (1-2): 75-87.

Wood, M. E., K. A. Fox, J. Jennings-Gaines, H. J. Killion, S. Amundson, M. W. Miller and W. H. Edwards. 2017. How respiratory pathogens contribute to lamb mortality in a poorly performing bighorn sheep (*Ovis canadensis*) herd. Journal of Wildlife Diseases. 53 (1): 126-130.

Wood, S. H. 1994. Seismic expression and geological significance of a lacustrine delta in Neogene deposits of the western Snake River Plain, Idaho. AAPG Bulleting. 78 (1): 102-121.

Woodsmith, R. D. and J. M. Buffington. 1996. Multivariate geomorphic analysis of forest streams: implications for assessment of land use impact on channel condition. Earth Surface Processes and Landforms. 21 (4): 377-393.

Wormworth, J. and K. Mallon. 2006. Bird species and climate change. Global Status Report version 1.0. Climate Risk Pty Ltd, Fairlight, NSW, Australia. 76 p.

Worrall, J. J., L. Egeland, T. Eager, R. A. Mask, E. W. Johnson, P. A. Kemp and W. D. Shepperd. 2008. Rapid mortality of Populus tremuloides in southwestern Colorado, USA. Forest Ecology and Management. 255 (3): 686-696.

Wright, C. S. and J. K. Agee. 2004. Fire and vegetation history in the eastern Cascade Mountains, Washington. Ecological Applications. 14 (2): 443-459.

Wright, J. P., C. G. Jones and A. S. Flecker. 2002. An ecosystem engineer, the beaver, increases species richness at the landscape scale. Oecologia. 132: 96-101.

Wu, J. and Y.-S. Kim. 2013. Pricing ecosystem resilience in frequent-fire ponderosa pine forests. Forest Policy and Economics. 27: 8-12.

Wu, J. and O. L. Loucks. 1995. From balance of nature to hierarchical patch dynamics: a paradigm shift in ecology. The Quarterly Review of Biology. 70 (4): 439-466.

Y

Yeo, J. J., J. M. Peek, W. T. Wittinger and C. T. Kvale. 1993. Influence of rest-rotation cattle grazing on mule deer and elk habitat use in east-central Idaho. Journal of Range Management. 46 (3): 245-250.

Young, M. K. 1994. Movement and characteristics of stream-borne coarse woody debris in adjacent burned and undisturbed watersheds in Wyoming. Canadian Journal of Forest Research. 24 (9): 1933-1938.

Z

Zahniser, H. 1963. National wilderness preservation act hearings. Supplementary statement in National Wilderness Preservation Act, hearings before the Committee on Interior and Insular Affairs (88th Congress, Ist session) onS. 4, February 28 and March 1: 68.

Zald, H. S. J., T. A. Spies, M. Huso and D. Gatziolis. 2012. Climatic, landform, microtopographic, and overstory canopy controls of tree invasion in a subalpine meadow landscape, Oregon Cascades, USA. Landscape Ecology. 27 (8): 1197-1212.

Zeigenfuss, L. C., F. J. Singer and M. A. Gudorf. 2000. Test of a modified habitat suitability model for bighorn sheep. Restoration Ecology. 8 (4S): 38-46.

Zhang, J. W., R. F. Powers and C. N. Skinner. 2010. To manage or not to manage: the role of silviculture in sequestering carbon in the specter of climate change, Integrated management of carbon sequestration and biomass utilization opportunities in a changing climate, Boise, ID, U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, 95-110.

Zhu, Y. and R. E. Newell. 1994. Atmospheric rivers and bombs. Geophysical Research Letters. 21 (18): doi:10.1029/94GL01710, 4 p.

Zhu, Y. and R. E. Newell. 1998. A proposed algorithm for moisture fluxes from atmospheric rivers. Monthly Weather Review. 126 (3): 725-735.

Ziemer, R. R. 1964. Summer evapotranspiration trends as related to time after logging of forests in Sierra Nevada. Journal of Geophysical Research. 69 (4): 615-620.

Ziemer, R. R. 1979. Evaporation and transpiration. Reviews of Geophysics. 17 (6): 1175-1186.

Ziemer, R. R. 1987. Water yields from forests: an agnostic view, Callaham, R. Z. and J. J. DeVries, eds. Proceedings of the California Watershed Management Conference, West Sacramento, California, Wildland Resources Center, University of California, Berkeley, 74-78.

Zvolanek, E., J. Kuiper, A. Carr and K. Hlava. 2013. Analysis of renewable energy potential on U.S. National Forest lands. ANL/EVS-13/1. Argonne National Laboratory, Environmental Sciences Division, Argonne, IL. 130 p.

Zwolak, R. 2009. A meta-analysis of the effects of wildfire, clearcutting, and partial harvest on the abundance of North American small mammals. Forest Ecology and Management. 258 (5): 539-545.